entire section on the Babcock Test; he has in addition influenced the formulation of our material in almost all of its parts.

Acknowledgment is due the Psychological Corporation of New York, C. H. Stoelting Co. of Chicago, Dr. David Wechsler, and Dr. H. A. Murray for permission to describe and quote from tests developed and/or copyrighted by them.

David Rapaport

FOREWORD

These volumes represent an attempt to explore systematically the diagnostic potentialities of seven psychological tests, used simultaneously.

Although our results are grossly in accord with our clinical experience before, during, and since this study, we are aware that these volumes justify manifold criticism. Some of this criticism may be anticipated here.

Diagnosis implicates all the issues of nosology, a woefully unsettled field in psychiatry as well as abnormal psychology. We therefore worked in ground which is inevitably controversial. We neither accepted any mechanical nosology nor disregarded existing nosology. We defined our nosological categories as seemed to us most useful, in view of our case-material and the purpose of this study. Thus we are open to the criticism of the adherents of any single school of nosology.

In all tests, we advocated not a mechanically standard procedure of administration, but one which creates optimal conditions for the patient. Although we have argued for observing the original testing procedure, we are open to the critique of the psychometrician.

We presented statistical evaluations of our results, yet did not hesitate to call on experience and reasoning not supported by statistics. The statistician will criticize this procedure, as well as the smallness of our groups and the statistical method of "corrections for small samples" which we used. Yet we felt it better to present what experience teaches than to by-pass it for lack of statistical evidence; we felt it better to use "small sample" methods than to wait ten more years for "bigger samples" of homogeneous groups, or to use groups even less *reasonably* homogeneous than clinical material must be, or to present no statistical evaluations.

To make diagnosing possible, we argued the necessity of a rationale of the psychological processes underlying the test performance; this, when used in conjunction with the clinically known facts of different mental disorders, would make it possible to infer the maladjustment process from the amount and quality of impairment. In developing such rationales, we have often trod on disputed and at times uncharted territory, where we could hardly expect to escape criticism.

We have indicated that generalizations on the basis of data are not to be taken as "laws," that variations from our data in the different maladjustments are to be expected, and that we should attempt to understand these with the help of the rationale presented and the full tabulation of raw data in Appendix II. In this we will be said by some to be overpositive, and by others not positive enough.

Our choice of a control group will also be criticized. Yet the idea of a "matched" control group for our clinical population has little meaning in the light of modern psychopathology, and little possibility in our culture. Matched for age? or for I.Q.? or for personality structure? or for schooling? or for family background? Our best procedure seemed to be to take a homogeneous group of more or less well-functioning subjects, and explore what they are like clinically.

Our graphs deviating from the customary bar-graphs, our lack of some tests on many cases, our lack of statistical treatment of two tests, all offer additional targets for criticism.

Yet, withal, it appeared worthwhile and necessary to undertake this task; and under the given conditions of our work, of nosology, of the status of clinical psychology and the psychology of thinking, we did all that seemed possible to us. On any single test or single nosological category, much more could have been done. But, at the present stage of clinical psychology, we felt the need was for a larger view of a variety of categories and a variety of tests, the inescapable weaknesses of such a presentation notwithstanding.

CONTENTS

Part One

INTRODUCTION

Introduction 3
- A. Psychological Tests in Clinical Work 3
- B. Aims and Approach 4
  - 1. The Choice of Tests 5
  - 2. Clinical Validation 8
  - 3. The Extension of Clinical Application 9
  - 4. On the Psychological Rationale of Tests 10
- C. Procedure and Premises 12
- D. The Clinical Examination 15
- E. Nosological Considerations 16
  - 1. The Research Population and the Principles of Classification 16
  - 2. The Schizophrenic Groups 18
  - 3. The Preschizophrenic Groups 21
  - 4. The Paranoid Conditions 22
  - 5. The Depressive Groups 23
  - 6. The Neurotic Groups 24
  - 7. The Control Group 28
- F. The Plan of Presentation 31
- G. Further Remarks 34

Part Two

DIAGNOSTIC INTELLIGENCE TESTING

Chapter I: The Nature of Intelligence 37
- A. The Change of Psychological Conceptions 37
- B. The Determinants of Intelligence Test Achievement 37
- C. The Approach to Functions Underlying Test Achievement 40

Chapter II: The Bellevue Scale 44
- A. Introduction 44
  - 1. The Plan of the Chapter 44
  - 2. A Description of the Test 44
  - 3. On Testing Technique 46
- B. The Concept of Scatter 48
  - 1. The Definition of Scatter 48
  - 2. The Assumptions Underlying Scatter Analysis 49
  - 3. The Scatter Measures 51
- C. The Major Scatter Patterns: Results and Interpretations 54
  - 1. Positive and Negative Vocabulary Scatter 55
  - 2. Composite Vocabulary Scatter 57
  - 3. Differential (P − V′) and Total (P + V′) Scatter 61
  - 4. Vocabulary Scatter: "t"-Test 65
  - 5. Mean Scatter 67
  - 6. Great Negative Vocabulary Scatter 72
  - 7. General Diagnostic Conclusions 73

D. Introduction to the Analysis of Bellevue Subtests 78
E. Vocabulary 87
  1. Introduction 87
  2. The Psychological Rationale of the Vocabulary Subtest 87
  3. Administration 90
  4. Item Analysis of the Vocabulary Subtest 91
  5. The Variability of the Vocabulary Score 99
  6. Mean Scatter of the Vocabulary Subtest 102
  7. Analysis of the Extreme Weighted Scores of the Vocabulary Subtest 106
  8. General Diagnostic Conclusions 108
F. Comprehension 109
  1. Introduction 109
  2. The Psychological Rationale of the Comprehension Subtest 110
  3. Administration 114
  4. Item Analysis of the Comprehension Subtest 115
  5. Comprehension and Information 120
  6. The Vocabulary Scatter: "t"-Test 122
  7. The Vocabulary Scatter: Chi² Test 123
  8. Modified Mean Scatter: Chi² Test 123
  9. Analysis of the Extreme Weighted Scores of the Comprehension Subtest 126
  10. General Diagnostic Conclusions 128
G. Information 129
  1. Introduction 129
  2. The Psychological Rationale of the Information Subtest 129
  3. Administration 131
  4. Item Analysis of the Information Subtest 132
  5. Vocabulary Scatter and Mean Scatter of Information: "t"-Test .. 137
  6. Vocabulary Scatter 139
  7. Modified Mean Scatter: Chi² Test 140
  8. Analysis of the Extreme Weighted Scores of the Information Subtest 144
  9. General Diagnostic Conclusions .... 146 ✓
H. Similarities 146
  1. Introduction 146
  2. The Psychological Rationale of the Similarities Subtest 147
  3. Administration 151
  4. Item Analysis of the Similarities Subtest 152
  5. Vocabulary and Mean Scatter: "t"-Test 156
  6. Vocabulary Scatter: Chi² Test 158
  7. Modified Mean Scatter: Chi² Test 160
  8. Analysis of the Extreme Weighted Scores of the Similarities Subtest 164
  9. General Diagnostic Conclusions 165
I. Attention and Concentration: Digit Span and Arithmetic 166
  1. Comparison with the Verbal Subtests 166
  2. General Considerations 166
  3. The Definitions of Attention and Concentration 167
  4. The Relation of Digit Span and Arithmetic Scatter 169
J. Digit Span 176
  1. Introduction 176
  2. The Psychological Rationale of the Digit Span Subtest 176

3. Administration 179
4. The Relation of Digits Forward to Digits Backward 180
5. Vocabulary Scatter of Digit Span: "t"-Test 182
6. Vocabulary Scatter of Digit Span: Chi² Test 185
7. Modified Mean Scatter: Chi² Test 189
8. Analysis of the Extreme Weighted Scores of the Digit Span Subtest 190
9. General Diagnostic Conclusions 193

K. Arithmetic 194
1. Introduction 194
2. The Psychological Rationale of the Arithmetic Subtest 195
3. Administration 200
4. Item Analysis of the Arithmetic Subtest 200
5. Vocabulary Scatter: "t"-Test 207
6. Vocabulary Scatter: Chi² Test 207
7. Modified Mean Scatter: Chi² Test 209
8. Analysis of the Extreme Weighted Scores of the Arithmetic Subtest 211
9. General Diagnostic Conclusions 214

L. Picture Arrangement 214
1. Introduction 214
2. The Psychological Rationale of Picture Arrangement 215
3. Administration 220
4. Item Analysis 220
5. Vocabulary and Mean Scatter: "t"-Test 223
6. Vocabulary Scatter of the Picture Arrangement Subtest: Chi² Test 225
7. Modified Mean Scatter: Chi² Test 226
8. Analysis of the Extreme Weighted Scores of the Picture Arrangement Subtest 228
9. General Diagnostic Conclusions 230

M. Picture Completion 230
1. Introduction 230
2. The Psychological Rationale of Picture Completion 231
3. Administration 233
4. Item Analysis 234
5. Vocabulary Scatter and Mean Scatter: "t"-Test 239
6. Vocabulary Scatter: Chi² Test 242
7. Modified Mean Scatter: Chi² Test 244
8. Analysis of the Extreme Weighted Scores of the Picture Completion Subtest 246
9. General Diagnostic Conclusions 248

N. Visual-Motor Coordination 249

O. Object Assembly 253
1. Introduction 253
2. Visual-Motor Coordination in the Object Assembly Subtest 254
3. Administration 259
4. Vocabulary Scatter and Mean Scatter: "t"-Test 259
5. Vocabulary Scatter: Chi² Test 263
6. Modified Mean Scatter: Chi² Test 265
7. Analysis of the Extreme Weighted Scores of the Object Assembly Subtest 267
8. General Diagnostic Conclusions 270

- P. Block Design 271
  - 1. Introduction 271
  - 2. Visual-Motor Coordination in the Block Design Subtest 271
  - 3. Administration 276
  - 4. Qualitative Item Analysis 276
  - 5. Vocabulary Scatter and Mean Scatter: "t"-Test 278
  - 6. Vocabulary Scatter: Chi² Test 280
  - 7. Modified Mean Scatter: Chi² Test 282
  - 8. Analysis of the Extreme Weighted Scores of the Block Design Subtest 284
  - 9. Special Comparison of Block Design and Picture Completion 286
  - 10. General Diagnostic Conclusions 287
- Q. Digit Symbol 288
  - 1. Introduction 288
  - 2. Visual-Motor Coordination in the Digit Symbol Subtest 289
  - 3. Administration 291
  - 4. Vocabulary Scatter and Mean Scatter: "t"-Test 291
  - 5. Vocabulary Scatter: Chi² Test 293
  - 6. Modified Mean Scatter: Chi² Test 295
  - 7. Analysis of the Extreme Weighted Scores of the Digit Symbol Subtest 295
  - 8. General Diagnostic Conclusions 298
- R. The Scatter Pattern of Our Clinical and Control Groups 299
  - 1. The Schizophrenic Groups 301
  - 2. The Paranoid Conditions 305
  - 3. The Preschizophrenic Group 306
  - 4. The Depressive Groups 308
  - 5. The Neurotic Groups 310
  - 6. The "Normal" Control Group 312
  - 7. High and Low Weighted Scores 317

CHAPTER III: THE BABCOCK TEST 319
- A. Introduction 319
- B. The General Structure of the Test 320
- C. The Subtests and Their Psychological Rationale 321
  - 1. The Subtests of the Repetition Group 321
  - 2. The Subtests of the Learning Group 323
  - 3. The Subtests of the Motor Group 329
- D. The Technique of Administration 331
- E. Statistical Results 334
  - 1. The Average Vocabulary Age of Our Clinical and Control Groups 334
  - 2. The Statistical Evaluation of the Total Efficiency 336
  - 3. The Statistical Evaluation of the Repetition Subtests 341
  - 4. The Statistical Evaluation of the Learning Subtests 345
  - 5. The Statistical Evaluation of the Motor Subtests 372
  - 6. General Diagnostic Conclusions 379

PART THREE

DIAGNOSTIC TESTING OF CONCEPT FORMATION

CHAPTER I: INTRODUCTION TO THE TESTING OF CONCEPT FORMATION 385
- A. The Place of Concept Formation in Thought Processes 385
- B. Concept Formation from the Point of View of Logic 389
- C. The Plan of Presentation and the Approach to Concept Formation 391

Chapter II: Verbal Concept Formation 394
Chapter III: The Sorting Test 396
  A. Introduction 396
    1. The Problem 396
    2. The Plan of the Chapter 396
    3. A Description of the Test 397
  B. The Psychological Rationale of Sorting Behavior, of the Sorting Test, and of Scoring 398
    1. Sorting Behavior 398
    2. The Sorting Test 399
    3. The Process of Sorting 400
    4. The Rationale of Scoring 401
  C. The Administration of the Test 406
    1. Instructions 406
    2. Inquiry 407
    3. Further Remarks on Administration 408
  D. Item Analysis 409
    1. Part I of the Sorting Test 409
    2. Part II of the Sorting Test 412
  E. Statistical Results 416
    1. Adequacy of Sorting (Part I) and of Verbalization (Part II) 416
    2. The Concept Span on Part I 425
    3. The Conceptual Level 433
  F. General Conclusions 450
    1. The Patrol 453
    2. The Unclassified Schizophrenics 454
    3. The Paranoid Schizophrenics 456
    4. Simple Schizophrenics 457
    5. The Paranoid Conditions 457
    6. The Preschizophrenics 458
    7. The Depressives 458
    8. The Neurotics 459
Chapter IV: The Hanfmann-Kasanin Test 462
  A. Introduction 462
  B. The Psychological Rationale of the Hanfmann-Kasanin Test 463
    1. General Considerations 463
    2. Flexibility, Fluidity, Persistence, and Rigidity in the ourse of Performance 464
    3. The Attempts at Solution 467
  C. Administration 472
  D. Diagnostic Indications 473
Chapter V: Patterns of Achievement on the Three Concept Formation Tests 478
  A. Relationships between Verbal Concepts and Sorting Behavior 479
  B. The Place of the Hanfmann-Kasanin Results 483

Bibliography 485

Appendix I: Vital Data of our Clinical and Control Population 489
Appendix II: Tables. Group Averages and Individual Scores 515
Appendix III: Review of Literature, by Martin Mayman 548

Indexes 567

PART ONE

INTRODUCTION

INTRODUCTION

A. PSYCHOLOGICAL TESTS IN CLINICAL WORK

The material presented here is the outgrowth of cooperation of clinical psychologists and psychiatrists over a period of several years. It is intended to be a factual summary of the concentrated utilization of the most recent and most advanced testing procedures which psychology has to offer clinical psychiatric work. It is hoped it will represent a step forward in the systematization of those principles of the psychology of thinking which are part of the necessary background to a proper qualitative evaluation of these tests.

Clinical psychiatry has two basic and time honored methods: that of the case history, and that of clinical observation. Both of these methods are powerful tools in the hands of the experienced psychiatrist; nevertheless, each has shortcomings. Historical information, whether obtained from the patient or from other informants, will have omissions and distortions. It is up to the astuteness of the psychiatrist to follow up omissions and to rectify distortions. Thus, in gathering the material on which the diagnosis is to be based, the historical case material is affected by subjective factors on the part of both informant and psychiatrist. The same is true for observational data included in the psychiatric examination and report of the psychiatrist. Such reports can do no more than pick out a few highlights of the patient's behavior which, as a time sample, may be inadequate, and even though correct qualitatively and useful practically, are nevertheless subjectively selected by the psychiatrist.

Psychological testing is an effort to obtain whole and systematic samples of certain types of verbal, perceptual, and motor behavior, in the frame of a standardized situation. The advantage of data collected in psychological tests is that little, and in many tests no, subjective selection is involved in securing the data.

In the psychiatrist's organization of the case material, his experience and knowledge, colored by subjective factors, play a considerable rôle. In psychological tests, more or less standard scoring systems provide for an organization of the data which is relatively free from such subjective factors. It is true that in applying the scoring systems there is more likelihood for subjective factors to enter the test material than there is in securing the raw test data. Nevertheless, even in the scoring organization of the test data the rôle of subjective judgment is definitely limited, in comparison to the psychiatrist's organization of the case-historical and observational material.

The last step in both the psychiatrist's and the clinical psychologist's procedure is the evaluation of the organized material, which in one case is the case history and observational material, and in the other the test material. Subjective judgment, based on a wealth of experience, inevitably enters the work of both psychiatrist and psychologist at this point. But the psychiatrist's organized material pertains uniquely to the individual patient in question, and resists inter-individual comparison; whereas the psychologist's organized test material is in terms of scores and patterns which allow for inter-individual comparison with numerical scores and score patterns of other cases. For this reason, even at the point where subjectivity enters the work of both psychiatrist and psychologist, the latter is at an advantage because the objective comparability of numerical test results delimits the rôle of subjective judgment.

The clinical psychological testing procedures may be especially valuable to clinical psychiatry in certain special circumstances. Where case history is missing, insufficient, or for other reasons unsatisfactory, the possibility of obtaining the necessary information by means of tests gains in importance. In situations where time is not sufficient, or where other limitations make the taking of case history inadvisable, the information obtainable through tests may be invaluable. Where the scarcity of psychiatric service makes it necessary that the psychiatrist devote himself to therapeutic work, leaving relatively little time for intensive diagnostic study, testing procedures become an important adjunct in shortening laborious case-history-taking and observation.

It is not the opinion of the present authors that the emergency use of testing procedures is their ideal use; they are convinced that the safe and ideal use of these procedures lies in the obtaining of parallel and independent clinical and testing data. It must be recognized, however, that sufficient psychiatric service is not available even in peace time, and that the present war situation makes for many emergencies, such as those enumerated above, in which the rôle of test information increases in importance.

B. AIMS AND APPROACH

The need for such a volume as the present one may require explanation, inasmuch as fundamental, or at least general, books and articles on nearly all of the testing procedures dealt with here have been published in the last ten years. There has been no aim to duplicate these publications.[1]

Our aims have been four-fold: 1. We have attempted to show how the eight tests which are the subject of the investigation reported here were welded in our clinical work into a single diagnostic tool. 2. We have attempted to validate those of the tests which have already been put to general clinical psychological use, but for which no systematic clinical validation has been offered in the past; and to develop into easily handled diagnostic indicators some of their neglected characteristics, which have been found useful in our clinical work and experience. 3. We have attempted to put to general use some of these tests which were hitherto used only in the study of specific groups of cases. With these tests our effort was to develop them into tests of general diagnostic use by designing and validating new scoring and new interpretation criteria. 4. We have attempted to develop a psychological rationale for each of these tests and for the different types of responses on them; because without such a rationale the tests and test results must remain meaningless to the psychiatrist, and a matter of automatic procedure and mechanical comparison to the clinical psychologist. We shall discuss and amplify each of these aims in turn.

---

[1] For space considerations we have avoided, wherever feasible, discussion of the relation of our methods and results to previous work. To fill in the background, and to allocate credit, we shall give summaries of the literature at the end of each volume in appendices.

1. The Choice of Tests. In order to clarify in what sense we have attempted to weld the battery of tests into a single instrument, it will be necessary to discuss the selection of the tests and to indicate their relation to each other. The battery reported here includes the following tests: the Wechsler-Bellevue Adult and Adolescent Intelligence Scale, the Babcock Deterioration Test, the Sorting Test, the Hanfmann-Kasanin Test, the Rorschach Test, the Thematic Apperception Test, the Word-Association Test, and the Szondi Test.

The leading idea around which this battery of tests was organized is that different aspects and levels of functioning of the patient should be given a chance to manifest themselves in the tests. This idea impressed itself upon us in the course of our clinical experience. The two main points of this experience may be summed up as follows:

(a) No single test proves to yield in all cases a diagnosis, or to be in all cases correct in the diagnosis it indicates.

(b) Psychological maladjustment, whether severe or mild, may encroach on any or several of the functions tapped by these tests, leaving other functions absolutely or relatively unimpaired.

It appears worthwhile to expound some of the implications of these two points, because the significance attached to them implies, to a certain extent, the approach of the present authors to diagnostic procedure with these tests.

The first point, that no single test is always in itself diagnostic, has several implications. First, it is possible to obtain test records which are definitely non-representative of the general makeup of the subject tested, when test results are determined by a specific background, by a prevalent attitude, or by a momentary condition. Examples for these would be a Bellevue test obtained from a new immigrant, a Rorschach test of a physician, and any test of a person in a toxic condition. It may justly be argued that such tests are nevertheless representative. They are: but they do not give us on these persons what they give on others—namely, a schematic picture of a personality and a general clinical diagnosis. It is in this sense that the expression "not representative" will be henceforth used. Second, the test results may appear to be inconclusive. In such cases it often remains a moot question whether this is due to a basic limitation of the test, or is inherent in the limits of the examiner's experience with the test. Third, single tests may be, and frequently are, misdiagnosed; and only later does it become clear that the test told the story truly, but that the examiner failed in spite of adequate experience to grasp it. It is then the responsibility of the clinical psychologist to use tools which eliminate these deficiencies of single tests. The battery here reported is an attempt to evolve such a tool. The advantages of such a battery of tests are that indicators, which for some reason are absent in one or several of the tests, are likely to be present in others; that indicators in the different tests are likely to support and supplement each other; and that the presence of indicators in some of the tests may call attention to more subtle indicators in others which might otherwise have been overlooked.

The second point, that psychological maladjustment may encroach upon certain functions but not others, is an expression of the idea of relative functional autonomy in the psychic makeup. It is a frequent experience that a deeply disorganized person has still enough hold on reality to maintain a part of his rational thinking intact, and to enable him to give a relatively well-organized test performance on one or more tests. It is possible, for example, that a psychotic disorganization will leave the digit-span of a person not only intact, but so excellent that one may be inclined to attribute the extremely high score to a pathological shift in the functional assets of the subject. On the other hand, a state of anxiety in a maladjusted but not generally disorganized person may result in an apparently grave impairment of any or several test achievements. Thus any single test may lead to conclusions which, though representing correctly one aspect, do not take account of other aspects of the subject's makeup; and the resulting diagnosis may over- or underestimate the malignancy of the actual maladjustment.

In the selection of the battery of tests, then, the leading idea was to obtain material reflecting different aspects and levels of the individual's psychic makeup. Experience showed that on one level of the psychic makeup, as seen in the tests tapping it, a temporary condition or a certain type of maladjustment may wreak havoc, making the test "non-representative"; but that other levels, as seen in the tests tapping them, may remain relatively well-organized, and specifically diagnostic. Thus, for example, in some anxiety conditions the content of the Rorschach Test may be purely anatomical and hardly distinguishable from those of some psychotics; but the Sorting Test and/or the intelligence tests are likely to remain well-organized. Thus the tests of our battery were chosen to represent relatively autonomous levels and aspects of the psyche. An intelligence test was chosen to represent intellectual functioning in general. We chose the *Bellevue Scale* because it is a test in which the subtests are systematically grouped and not distributed into mental age levels; accordingly, the selective impairment of the relatively autonomous functions implied in each of these subtests may be studied. The *Babcock Test* was chosen to obtain an indication of whether the I.Q. obtained reflects a full or an impaired mental efficiency. Furthermore, certain individual items of this test—such as immediate and delayed recall of a story—were felt to be necessary complements to the Bellevue Scale. The *Sorting Test* and the *Hanfmann-Kasanin Test* were chosen on the consideration that concept formation is one of the basic components of every intellectual function. In them—we assumed, and believe it to be proved by our experience—we can see one of the channels through which maladjustment encroaches upon intellectual functioning. The reason for using both was that while the Sorting Test reflects the more stereotyped and everyday concept formation, the Hanfmann-Kasanin Test shows the personality in action solving a new conceptual problem. Furthermore, experience showed that the Similarities Test of the Bellevue Scale, the Sorting Test, and the Hanfmann-Kasanin Test are tests of functionally autonomous, different levels of concept formation. The *Rorschach Test* was chosen to obtain a scheme of personality structure, an estimate of endowment on which the concept formation and intelligence structure are built, and a picture of the relationships of affects and anxieties to endowment and its efficacy of functioning. The Rorschach Test was supplemented by the *Szondi Test*—which will not be treated here—in order to obtain supportive indicators concerning the clinical diagnosis and personality description yielded by the Rorschach Test; and to obtain supplementary information, not provided by the Rorschach Test, concerning the specific relations of instinctual forces to each other and to the personality pattern. The *Thematic Apperception Test* was chosen to obtain a picture of the actual thought contents, attitudes, and feelings of the subjects, and to enable us to fill in the skeleton of diagnosis, personality structure, and intelligence structure, with the flesh and blood of actual ideational and feeling contents. With a similar, though more limited, aim, the *Word Association Test* was chosen in an effort to gain material supporting that of the Thematic Apperception Test, by spotting those verbal ideas around which association disturbances—or in other terms, conflicting attitudes—cluster. Both of these tests of content also yield direct diagnostic indicators through the disturbances of thought and perceptual processes revealed by them.

The fact that in this study and in our clinical work we attempted to use consistently this battery of eight tests, representing approximately six hours of test administration, does not imply that all of these tests are indispensable for reliable diagnosis in every case. In practice, one or two tests will indicate which, if any, other tests are to be administered to assure a safe diagnosis. It is maintained, however, that in the present state of our knowledge of personality and maladjustment—in which the interrelationships of functions are so obscure—the clinical psychologist is on much safer ground when he has a battery of tests, rather than but a few, on which to base his diagnosis. The use of full batteries of tests is the more recommendable since only such practice yields the kind of experience and material on which to rear a better theoretical understanding of, and better testing practices for, the interrelationships and autonomy of different functions in adjustment and maladjustment. One must remember that, while depth psychology as well as experimental psychology has clarified many functional-dynamic relationships, the realm of psychological functions tapped by testing procedures—and especially by the more modern procedures—has barely been touched by systematic investigation. This realm is more in the bounds of "ego psychology" than in those of the "psychology of the unconscious" explored by depth psychology. Even the "ego psychology" of depth psychology, with all its rapid advances, does not quite reach this realm. On the other hand, the psychological functions involved are more lifelike than those usually explored by experimental psychology. Thus psychological testing opens a new field of problems, and may become the laboratory out of which the psychology of thought processes, normal and abnormal, will issue.

The battery of tests reported here thus represents a hierarchy of testing procedures, tapping a hierarchy of psychological functions. At the base of this hierarchy are the tests that yield personality patterns and clinical diagnostic bearings; these are followed by tests of concept formation, this being the channel through which personality structure and maladjustment exert their formative influence on intelligence structure; these in turn are followed by intelligence and efficiency tests; and finally come the tests providing the ideational content of the formal patterns indicated by all the other tests.

2. Clinical Validation. It will be worthwhile to clarify the method we followed in the validation of these tests. In this, our guide was our clinical experience. In this experience we had come to use many tests, because the use of only a few tests left us frequently without a diagnosis, or with an incorrect diagnosis. In the course of the years we learned to look into the smallest detail of each test—into every subtest of each test, into every verbalization deviating from the usual form of each response, and even into every part of each response. In the work reported here, we have attempted to follow through in all our material this minute, meticulous, step-by-step analysis. We knew from clinical practice what was useful and what was not useful for clinical work. We looked for statistical validation of the indicators derived from experience; but we also analyzed systematically and selectively our material, in order to see whether or not in our clinical experience any significant indicators had escaped our attention. We attempted to assess statistically the extent of diagnostic usefulness of each of the single indicators. All through these evaluations we emphasized again and again that although an indicator may differentiate one clinical category from the others to a statistically significant degree, it remains clinically merely one of many indicators; and that as there is generally some degree of overlap of most indicators in the different clinical groups, the presence of one indicator in most cases allows only for setting up a hypothesis as to the personality diagnosis and/or clinical-nosological diagnosis. It therefore follows that only the massing of such indicators can become a basis of a reliable diagnosis. For this reason, although the systematic presentation of our results may become a valuable guide to practice and to gaining experience, it cannot replace experience. The fact is that experience is necessary for the evaluation of what does, and what does not, constitute a massing of diagnostic indicators.

3. The Extension of Clinical Application. It will be necessary to survey in what respect we have developed significant but neglected features in different tests, or have brought about the possibility of a more general application of them. In the study of the Bellevue Scale we concentrated upon scatter analysis, believing that to use this test as a mere intelligence test is to neglect the diagnostic potentialities to be found in the dynamic relationship of its subtests to each other. In other words, we attempted to make of this test of intelligence a diagnostic clinical test. In connection with the Babcock Test, we attempted to extract its most useful features; by doing so we hoped not only to reduce the labor of administration, but to make it a psychologically more meaningful and homogeneous test. In connection with the Concept Formation Tests, our task was to expand their previously limited usage. We put both the Sorting Test[2] and the Hanfmann-Kasanin[3] concept formation test to use in diagnosis of psychoses and neuroses and borderline adjustment; previously both had been limited to the study of schizophrenic and organic cases. We made the Sorting Test an effective tool for clinical diagnosis by developing a new scoring method, sensitive enough to indicate disturbances more subtle than the gross schizophrenic and organic disturbances previously studied.

---

[2] This is the Goldstein-Weigl-Scheerer Test, which has often been erroneously referred to as B.R.L. Sorting Test.

[3] Originally the Ach-Sacharow-Vigodtsky Test.

In the study of the Rorschach Test, we stressed the limitations of this rapidly spreading test, which is at present the most useful, and apparently the most misused, clinical tool. On the one hand, we dispensed with complicated "refinements" that proved of little significance in clinical work; on the other hand, we called attention to and created a systematic framework for the appraisal of the diagnostic significance of the patient's verbalization of his responses. In the study of the Word Association Test, our task was to revive a corpse which had been brought to an early grave by mechanical application and mechanical statistical treatment. We introduced a systematic qualitative point of view which is directly useful in evaluating individual test performance. In the use of the Thematic Apperception Test, we strove for a concrete clinical applicability rather than general personality description; for this purpose we introduced a new qualitative frame of reference to spot the diagnostically significant perceptions and verbalizations, and to locate the clinically significant contents.

4. On the Psychological Rationale of Tests. In order to develop a psychological rationale for these tests and the types of responses on them, we adopted the "projective hypothesis"[4]—namely, that every reaction of a subject is a reflection, or projection, of his private world. This approach to testing contrasts sharply with that usually characterized as "psychometric". The main aim was not to attribute to a person a percentile rank in the population or any other numerical measure allegedly representative of him. The aim was rather to understand the individual: to give him a chance to express himself in a sufficient number and variety of controlled situations, the nature of which has been well enough explored to enable the psychologist to infer, out of the subject's reactions, the gross outlines of his personality makeup. This expectancy, however, implies the "projective hypothesis"; it implies that every action and reaction of a human individual bears the characteristic features of his individual makeup. The choice of tests on the basis of this hypothesis would favor tests whose material is unconventional and not limited to eliciting habitual reactions. This hypothesis would find the Rorschach Ink-Blot Test most satisfactory; the Thematic Apperception Test less satisfactory; and the standard intelligence tests least satisfactory, because the intelligence test questions themselves would appear, at first glance, aimed at eliciting highly conventional responses. We included in this battery not only clearly pro-

[4] See Rapaport: Principles Underlying Projective Techniques (23).

jective tests; but we attempted to demonstrate that the projective hypothesis, though in generalized form, can be applied even to intelligence tests. In fact, we approached all of these tests with this hypothesis.

The projective approach is not concerned with the numerical percentage or age equivalent which, in the average population, corresponds to the subject's performance; its concern is to reconstruct out of features of the subject's reactions, or relationships of features in the subject's reactions, the specific individual dynamics in the living subject. Nevertheless, we did not take the usual attitude that in such cases statistical work is useless and unnecessary. We applied statistical procedures because we believe that they put clinically-discovered relationships into easily communicable and reasonably convincing form. We did not, however, take the stand that what one cannot prove statistically is not significant or not true.

Building our rationale implied often setting up hypotheses in the field of the psychology of thinking. Though the rationale here presented will remain frequently tentative, the setting up of such hypotheses was indispensable in an attempt to bridge the gap between the traditionally lifeless numerical-test results and the living clinical dynamics.[5] It is for this reason that: (1) we have attempted to give some rationale for the subtests of the Bellevue Scale; (2) we have discussed in detail some theoretical conceptions concerning memory function in connection with the Babcock Test; (3) we have devoted considerable space to a discussion of the general ideas of "concept formation"; (4) we have allotted a disproportionate number of pages to a relatively theoretical discussion of the different types of verbalization on the Rorschach Test; (5) we have discussed further aspects of the theory of memory functioning in connection with the Word Association Test; (6) we have advanced general considerations concerning perceptual and thought processes in connection with the Thematic Apperception Test, a procedure which to a degree differs from the usual treatment of this test.

We have limited ourselves to such theoretical considerations as would be immediately useful and necessary as background in clinical work. We attempted to remember at all times the aim stated in the preface to this volume, namely, to put a useful compendium of these modern testing procedures into the hands of psychologists in the hope that it will prove helpful in clinical work in general, and in work with psychiatric war casualties in post-war rehabilitation in particular.

---

[5] The gap between clinical psychiatry with its dynamic concepts on the one hand, and mechanical testing methods lacking theoretical background and integration on the other, is one of the reasons that clinical psychology has not achieved a real professional standing.

C. PROCEDURE AND PREMISES

It appears useful to review the conditions and premises under which the material here presented has been collected. The study grew out of clinical experience; it was not, as so many studies on tests are, the effort of academically-trained psychologists to "clean up", by systematic but mechanical statistical approach, the confusion of "hunches", "insights", and "intuitions" rampant in testing work. The significance of the diagnostic indicators of these tests has crystallized, for the present authors, in the course of evaluating test findings within the frame of reference of past findings, and of modifying that frame of reference so as to include new findings. The study itself was designed to put into communicable form what had thus far crystallized. This, then, was the basic attitude determining the conditions under which this research was conducted. Accordingly, the collaborating psychiatrist and statistician were thoroughly familiarized with the nature of the tests.

Another feature of these conditions was that we did not attempt validation of the contentions of a few source books. Rather, the concrete clinical problems of individual psychiatric cases on the one hand, and the concrete reality of everyday experience on the other, guided us. In other words, in the course of years of testing of acquaintances and patients, the question has always arisen: To what feature of their everyday behavior does this or that characteristic of their test performance correspond, and how does this correspondence come about? To answer this question, hypotheses were set up and modified steadily.

The major part of our experience prior to this study has been diagnosis of clinical cases without access to case history or presenting symptoms—though in most cases the patient was diagnosed by the same examiner who administered the tests. This was amended by experience with cases where the presenting symptom was known to us, and by cases where the patient was not seen and the tests were diagnosed "blind". All these conditions forced us to explore and exploit the potentialities of the tests to their utmost, and to adopt a variety of tests to cope with the problem of diagnosing solely by test-procedures. This condition of testing confronted us with the question, Is it possible to find testing procedures which will correctly elicit and diagnose personality and psychiatric status without reference to historical material?

The material of 217 clinical and 54 control cases on which this volume is based has been obtained by the following procedure:

(1) The tests used have been selected from those given over a period of three and one-half years to all clinical cases—out-patient or in-patient—seen at the Menninger Clinic. In the present study, only cases of children, the organic, character-disorder and addiction cases, and those atypical

cases which in terms of clinical findings did not lend themselves easily to nosological classification, have been excluded. By these exclusions we have attempted to make our clinical material as uniform as possible, in order to be in a position to present a systematic analysis. The reader will have already recognized that the task confronting us was a large one, and we wished to avoid complicating our presentation with further unknowns by introducing cases hardly classifiable nosologically, or by using groups of which our material seemed not sufficiently representative. This was the case in organic disorders, of which we have a limited group which would represent only a small section of the psychological disorders of organic origin; and in character disorders, where a much greater variety of problems lies than would meet the casual eye. The alcoholic group would have been relatively representative, and perhaps better studied than alcoholic case material usually presented in the literature; nevertheless, we preferred to forego the presentation of the problems of this group, since as a clinical psychiatric entity it is still an enigma. In other words, we simplified the task by cutting the extent of material in order to make the treatment of it more intensive.

(2) The subjects came for testing without the psychologist's being informed of the presenting symptoms, case history, or other data concerning their problems. Special care was taken to avoid conversation which would have involved information about the symptoms of the patient. Clinical diagnosis, personality description, and in many cases prognosis and treatment recommendations, were made on the basis of the test results so obtained. Only subsequent to this did the psychologist learn—for the most part at staff conferences in which clinical material, psychological test material, and laboratory material were presented simultaneously—what the case was like clinically. Less frequently, such information was obtained, after completion of the diagnosis, in discussion with the psychiatrist assigned to the patient.

(3) No attempt was made to proceed with the testing of all patients in the same manner. The requirement of "identity of conditions of testing" was interpreted to be a requirement for the tester to adapt himself to the specific characteristics of the patient. From an "objective" point of view, therefore, the attitude of the examiner varied from individual to individual. However, the varied attitudes were necessary to arouse approximately similar reactions in the varied patients to the testing situation.

The patients were prepared for their visits to the Psychology Department by their doctors; and when commencing the first test they were given an explanation that this was a psychological inventory of a type other than case history. Efforts were made to minimize the repugnance connected with the concept "test". The patient was told in advance to rest whenever tired. Although cigarettes and candies were offered, no effort to create "transference"—such as has been reported by some investigators on the Thematic Apperception Test—was made.

Of the purposes for which the tests have been used by us clinically, we shall concentrate in this report upon that of clinical diagnosis and personality description. The extent of our follow-up and retest studies on cases has not been sufficiently wide or varied to warrant discussion of prognosis and treatment recommendations made on the basis of the tests. We have characteristic samples of such prognosis and treatment recommendations, and follow-ups as to their success or failure; and we might have given some qualitative evaluation of this use of the tests. Again, however, we preferred to limit the extent of our discussion in order to deal intensively with the two problems of diagnosis and personality dynamics.

Some of the tests used were included in the battery late in the course of the three and one-half years during which the material of this study was collected. For this reason, in certain cases some of these tests will be missing. Some will be missing also in cases where the condition of the patient or extraneous circumstances set limits to testing or to the time available. We did not exclude these cases, because it was not systematic formal completeness but rather the completeness of intrinsic relationships for which we strove.

The cases used were all diagnosed and reported to the attending psychiatrist of the patient; and most of them to staff conferences as well. In this study we made no use of these reports; and inasmuch as our principles of scoring and evaluation changed in the course of our experience, we reexamined and rescored all of our material according to our most recent understanding. This rescoring was mostly done in conferences of two or all three of the psychologists collaborating on this study.

The premises and procedure described above imply a certain attitude toward the clinical psychologist in the psychiatric clinical setup, which crystallized in the course of the cooperation between psychologists and psychiatrists at the Menninger Clinic. Here the employment of the services of the clinical psychologist is a part of the effort to obtain maximum information about a patient, by various and independent procedures. The attending psychiatrist's discussions with the patient, the information from relatives and from doctors previously consulted by the patient, the hourly records of the nurses, the reports of the occupational and recreational therapists, the neurological and the general medical laboratory findings, and finally the clinical psychological information obtained by means of testing, are considered independent contributions pertinent to the understanding of the case. The clinical psychologist in this setup is engaged in work parallel to the investigative work of the psychiatrist. He does not participate in the work of treatment, except for re-testing the patients from time to time for whatever degree of improvement his testing procedures may indicate.

Whether or not the present authors consider this position of the clinical psychologist as ideal is beside the point. It is to be expected that many a clinical psychologist who is conducting treatment himself will feel that this is a too-limited view of the field of clinical psychology. But even for a psychologist engaged in such activity, information obtainable from tests may be of great value.

D. THE CLINICAL EXAMINATION

Case material of two different kinds has been used here. The material in the psychiatric cases was the usual case work-up of the Menninger Clinic; that of the normal cases was obtained from 54 randomly-chosen patrolmen and officers of the Kansas State Highway Patrol.

In the clinical cases, it was primarily the "Case Abstract"—a condensation into ten or twelve typewritten pages of all the material and examinational information concerning the patient—which was used. The staff conference discussion of the case and the follow-up notes after discharge have also been studied. In more dubious cases we had recourse to the detailed records of the examinations, observations, and consultations with relatives and informants, upon which the case abstract was based; we have often restudied the "progress notes" reflecting the patient's course in the Sanitarium; and we have consulted psychotherapists and/or attending psychiatrists specifically familiar with the case.

The case abstract itself opens with an identification of the case and a statement of the problem. This is followed by a description of the historical data pertinent to the life of the patient, including information obtained from the patient, relatives and acquaintances, the referring physicians, and physicians consulted previously by the patient. This information includes familial, developmental, educational, vocational, and medical history, and history of the present illness. This is followed by the section including the examinational data, which consist of:

(1) data of physical examination, including description of appearance, routine medical, routine neurological, routine chemical, routine dental, and routine Xray examinations;

(2) psychological examinations, including an account of the patient's reactions to the hospital and examinational routine; observations and investigations concerning the perceptual, intellectual, emotional, etc., pathology; a description of the patient's attitudes toward the persons and general situation of his past and contemporary life, and toward the clinical environment; the psychological testing reports; the report of the pre-

liminary interview with the psychoanalyst; and a discussion of the patient's general social situation;

(3) the course of the patient in the hospital;

(4) a description of the patient's sexual life, and other "especially confidential data";

(5) a case analysis attempting to give a reconstruction of the dynamics leading up to the present maladjustment, including congenital factors, early traumata, description of personality structure, adjustment to prevailing environmental situations, precipitating event, structure of maladjustment;

(6) a case summary, including the medical and surgical, the characterological, the psychiatric-syndrome, the symptomatic and the social diagnoses, treatment recommendations, and the statement of prognosis.

The normal-case material was collected in two one-hour interviews: the first by a psychiatric social worker; the second by the psychiatrist participating in this study, who at the time of his interview was familiar with historical material obtained by the social worker. This historical material was concerned mainly with the life-, educational-, familial- and occupational-background of the subject, but extended also to previous illnesses, general problems and difficulties, hobbies, habits, and interests. The psychiatrist's examination was centered on observing these "normal" subjects' behavior under the stress of examination. It included also inquiries into their attitudes toward the Patrol, their superiors, their colleagues and work, their family, and their aims in life. Points of possible psychiatric significance in their history, or in their behavior during this interview, were explored as far as possible without unduly stirring up the subjects. Finally, occupational information and a personal opinion of each man was obtained from the Chief of the Patrol, who had no knowledge of our results.

The study and classification of these case materials, clinical and normal, was conducted in a joint conference of the psychiatrist collaborating on this study and one of the psychologists, who discussed the case *without reference to test material.* The final decision concerning the classification of the case was left entirely to the psychiatrist.

E. NOSOLOGICAL CONSIDERATIONS

1. The Research Population and the Principles of Classification. The first major problem encountered in the analysis of our data was that of classification of cases. We made four decisions concerning this classification.

(a) We decided not to be limited by the initial diagnosis of the patient at admission, but rather re-evaluated the case in view of the course ot the patient in treatment and post-treatment follow-up.

(b) We decided also to reclassify the cases nosologically wherever vagueness of nosological concepts as reflected in the initial diagnosis would have put clinically-similar cases into different categories. If we had decided otherwise, we would have had to deal with too many nosological categories and too few cases in each for any kind of statistical study. This would have been the inevitable consequence of the clinical work in which this study was embedded: in this clinical work, the emphasis is put not so much upon uniformity of nosological classification, but rather upon expressing as sharply as possible the outstanding problems of the patient. This, however, was only one of the reasons for the rescrutinizing of the diagnoses; we wished to make sure that no other major factor, besides that referred to in the nosological categorization, was present in the case to cloud even the hope of getting a consistency of test results. In other words, although we decided to keep as much as possible within the framework of accepted nosological categories, our chief concern was to make a classification which would express the coherence of our cases—that is to say, the clustering shown by our psychiatric material.

(c) We adhered closely to a decision not to let the test results influence the nosological categorization. Although the senior psychologist of this study participated in the nosological work, the decision in any question of categorization was put entirely in the hands of the collaborating psychiatrist. It must be understood, however, that the psychiatrist was familiar with the general problems of the tests dealt with. Special efforts were made to reach an understanding of what kind of nosological classification would not cloud, but rather help to bring clearly to relief, the diagnostic features of the tests for different psychiatric, nosological categories. These procedures seemed to us to be inevitable, though they may leave the independence of classification from testing open, in some degree, to question. It was necessary that the psychiatrist and the clinical psychologist cooperate in setting up nosological categories which had meaning in terms of the diagnostic potentialities of the tests. Thus, one might state that though the individual case was always classified on clinical evidence, the classification categories were set up to divide or to unite only such groups whose division or unification would clarify the validity of the test indicators. Unification and division is inevitable in clinical classification; and nosology is a fluid discipline which, in many of its parts, is open to question. The present state of knowledge in the dynamics of psychopathological conditions is such that no hard-and-fast classification system has been set up yet which is not open to question. We have attempted to use dynamic understanding of the cases, and of the type of tests we used and the type of research we were conducting with them, to arrive at a classification which complies to a maximum degree with the standard classification, general ideas of dynamics, the original diagnosis, the opinion of the admission conference, the clinical course of the patient, and finally the kind of diagnostic indications that may be expected from the type of tests used.

(d) We decided to eliminate every case where either the major clinical or dynamic features of the case were questionable, or where there were several equally significant major features which did not permit the case to be subsumed under any category to which these features pertained.[6] Furthermore, we decided to exclude all purely character problems, all problems of addiction,[7] and all cases where organic features were clearly present. This was necessary to keep our categories as homogeneous as possible, and to include no more than could be handled within the framework of this study.

In the following pages we shall give the general nosological classification of our material. Where our classification coincides with usual nosological concepts of psychiatry—such as the general concept of schizophrenia—we have not given specific nosological definitions. Where our material required specific and, in the general nosological literature, not accepted delineation of groups—as in the "Preschizophrenia" and the "Anxiety and Depression" groups—we have given rather detailed descriptions of the symptoms and the characteristics of the groups so segregated. The same procedure has been followed in the case of the differential diagnostic considerations which we offer in this section. Where the basis for differential diagnosis is generally accepted in psychiatric nosological literature, we have not enlarged on the principles of differential diagnosis. But where new groups were set up, and the differential diagnosis from other groups was not immediately apparent, we have entered upon differential diagnostic discussions.

We shall defer discussion of our sub-classifications of the control group until after discussion of our classification of the clinical cases. We divided our clinical cases into five major groups: the Schizophrenias, the Preschizophrenias, the Paranoid Conditions, the Depressions, and the Neuroses. We shall discuss each of these in turn.

2. The Schizophrenic Groups. In our clinical setting, clear-cut catatonic psychoses with classical rigidity, or even with other motor symptoms approaching rigidity or "waxy flexibility", are extremely rare. We were wary of diagnosing catatonic schizophrenia merely on the basis of the occurrence of "catatonic excitement", as is often done. To distinguish a paranoid rage from a catatonic excitement or a manic outburst, which may color even a schizophrenic psychosis, is often very difficult and may lead to nosological confusion. Thus, the single case of clear-cut catatonia encountered, in the course of several years, in the material of this study, was excluded altogether; and no group of catatonic schizophrenia has been artificially constructed.

---

[6] We did use three cases—to be described later—in each of which two clear major features allowed for these cases being used in two categories.

[7] One such case was included, because the addiction features were greatly overshadowed by another clinical syndrome.

Similarly rare in our clinical work is the occurrence of hebephrenias. Partly, the cultural background of our cases may be responsible for the infrequent occurrence of this nosological entity in our work; partly, many cases diagnosed as hebephrenic schizophrenia may be the end-products of deterioration in a schizophrenic process which had its earlier acute and chronic phases. In a clinical set-up, where it is possible to investigate the past history of the patient, many a case diagnosed as hebephrenic schizophrenia will prove historically to be a schizophrenia of another category which was brought to a psychiatrist's attention only in a deteriorated state. Another reason we saw few hebephrenics is that, in general, relatives do not bring hopeless cases to our hospital. All schizophrenic-like reactions connected with toxic conditions or even precipitated by them, all connected with post-partum conditions, all connected with even the suspicion of the presence of an organic factor, have been meticulously eliminated from our material.

The material of schizophrenic cases which, after such curtailments, constituted our schizophrenic groups comprised 75 cases. 27 of these 75 cases were schizophrenias in which paranoid delusions predominated to such a degree that the diagnosis was clearly Paranoid Schizophrenia. Among these there were cases of many shadings, to a discussion of which we shall turn soon. 39 cases which were diagnosed as "Unclassified" Schizophrenias[8a] were also clear-cut schizophrenias. It is superfluous to consider here in detail what symptoms these schizophrenias were diagnosed on, or what constitutes in general a sufficient criterion of the presence of schizophrenia; this is a matter of general agreement, as far as concerns the groups of schizophrenias here dealt with. Nevertheless, we should like to state that in these cases the outstanding overt symptoms were inappropriateness of affect, delusions (including those of reference), withdrawal, and disorganized thinking. In the general cumulative table of cases,[8b] the specific presenting symptoms for each case can be checked. It should be mentioned that delusions of reference, however intense, in no case prompted us to classify a case with the Paranoid Schizophrenias; some depressive coloring was present in several of the Acute Paranoid and a few of the Acute Unclassified Schizophrenics.

[8a] The term "unclassified" here signifies that they do not belong clearly to any of the four classical schizophrenic syndromes: catatonic, hebephrenic, paranoid, and simple.

[8b] Appendix I contains the following data on each of our cases: age, sex, education and educational environment, occupation and parental occupation, and outstanding symptoms.

Both the Unclassified Schizophrenias and the Paranoid Schizophrenias have been subdivided into three groups: (a) acute, (b) chronic, (c) deteriorated. The criterion of *acute* cases was primarily the occurrence of an acute break after a previous adjustment. This is not to imply that when a chronic schizophrenic adjustment on a low level broke down into a more active schizophrenic period, it was classified as acute. It does imply, however, that when a break occurred after a previously poor, though not psychotic, adjustment, it was classified as acute; and so was a second attack after an apparent "complete remission". The criterion of *chronic* cases was a long-standing schizophrenic adjustment on a low level, even when no clear-cut acute schizophrenic episodes were historically demonstrable, and even when schizophrenic flare-ups were present at the time of testing and admission. In each of these cases, in the long-standing poor adjustment prior to admission, clear-cut signs of schizophrenic activity—though not necessarily with acute, full-fledged schizophrenic outbreaks—were to be demonstrable before the case was classified as "chronic". The criteria of *deteriorated* cases in the Unclassified group were the usual ones: leveling of the psychotic process to a stationary condition with no effort to change either surroundings or self, untidiness and loss of interest in appearance, disorganization of thinking, absolute flattening of affect, irrationality and incoherence in some cases even to the point of "word salad". Almost all of our deteriorated cases in the Paranoid group retained, however, a semblance of interest in appearance and behavior acceptable within the confines of an institution. The leveling of the psychotic process to a stationary condition, the disorganization of thinking, absence of affective rapport, lack of any trace of insight, were for these cases the criteria of deterioration.

The tabulation shows that we have 18 Acute Unclassified, 14 Chronic Unclassified, and 7 Deteriorated Unclassified Schizophrenic cases; and 11 Acute Paranoid, 10 Chronic Paranoid, and 6 Deteriorated Paranoid Schizophrenic cases. Though the number of cases is not large, the groups are as homogeneous as can be expected in the present state of psychiatric nosology.

The group of Simple Schizophrenias consists of 9 cases in which the most outstanding clinical feature in common was the discrepancy between the lack of affective rapport and the relatively well-retained formal front. They were all young people who had shown these characteristics all their lives with no history of an acute break. This group must be differentiated from psychopaths, since some of them showed antisocial behavior. They were not ingratiating, as psychopaths are, and committed their antisocial behavior with no planning, no excitement, and no aim of gain. As a rule they frankly confessed their antisocial acts with remarkable blandness and lack of affect. They had no insight. Of the 9 Simple Schizophrenic cases, 5 were of this type; 4 others were merely affectless, queer, bland cases, differentiated from the other Schizophrenics by a lack of rather than an inappropriateness of affect; a queerness, rather than delusions, was characteristic of them; and paranoid ideas, as well as a history of acute break, were absent.

3. The Preschizophrenic Groups. There were 33 cases in our material which we classified as Preschizophrenic. These were cases of schizoid personalities whose adjustment was so precarious that schizophrenic-like withdrawal tendencies in the guise of anxiety and inhibition, or schizophrenic-like ideational productions in the guise of obsessive-phobic thought, had already penetrated into their everyday life; thus any strain or stress could precipitate a schizophrenic psychosis, but under favorable chance conditions they might continue with such preschizophrenic behavior or ideation without an acute break. In some of these cases we have actually seen the psychotic break materialize later on.[9]

The characteristics of this group which serve as the basis for differential diagnosis from schizophrenia are the following:

(a) These cases show a prolonged period of maladjustment, although they were able to maintain a partial adjustment in the outside world and to conceal, in some degree, their distress.

(b) These cases all suffer marked anxiety; otherwise they show considerable lack of affect in regard to object-relationships.

(c) All have some degree of insight into their condition, and showed some realization that their difficulty was intra-psychic, and all voluntarily sought psychiatric help.

(d) Paranoid projections were generally absent.

This group was subdivided into two groups. One of these was characterized by blocking, withdrawal, marked anxiety, feelings of strangeness, incompetence, extreme inhibition of affect, and some kind of sexual preoccupation. We call this group the Coarctated (or inhibited) Preschizophrenic group. The other group was characterized by an enormous wealth of fantasy, obsessive ideation, obsessions, and preoccupation with themselves and their bodies; these subjects were intensely introspective and preoccupied with their own ideas, and at first sight were often not easily distinguishable from Obsessional Neurotics. We call this group the Over-

---

[9] Over-Ideational Preschizophrenic No. 17 was tested at another time in an acute psychotic condition, and the data then obtained are presented as Acute Unclassified Schizophrenic No. 3.

Accessioned No. 661

Ideational Preschizophrenic group. These Over-Ideational Preschizophrenics were differentiated from the Obsessional Neurotics partly by the wide range, fluctuation, and relative instability of their obsessive ideation and obsessional thoughts, and partly by the relative lack of experiencing these ideas as "ego alien".[10] The Coarctated Preschizophrenics were distinguished from all neurotic groups in that the tremendous amount of anxiety present was incongruous with the situations evoking it.

4. The Paranoid Conditions. 14 cases were grouped as Paranoid Conditions. These cases, though of considerable variety, were linked together by the rigid compulsive character-structure, good general premorbid adjustment,[11] and a varying degree of paranoid ideation, into which the majority had some degree of intellectual insight.

The first four of these cases—labeled "Paranoid States"—must be differentiated from the Acute Paranoid Schizophrenics. Here the paranoid break was short-lived, and in a sense was a "decompensation" of the good compulsive adjustment shown before the paranoid break. Though clear-cut delusions and confusion were present, these subjects were able to go about their work, even at the time of the paranoid break and after it. In their delusions, persons helped as well as persecuted them; and the paranoid break was really of an episodic character which blew over. All had some insight, and sought psychiatric help voluntarily. Primary schizophrenic thought-disorder, and dissociation or flattening of affect, were absent.

The remaining 10 cases were clearly differentiated from the Paranoid Schizophrenics by other criteria. Cases 5 to 8 might be justifiably called "Paranoid Characters". They too showed compulsive character structures; in addition, quarrelsome and suspicious traits pervaded their whole character and life-history, though these never became outright delusions. These traits frequently got the patients into trouble; they were unable to make a real adjustment, and when they did they soon broke it up; but meanwhile they went on with their lives in relative calmness for long periods. Cases 9 to 14 are cases with one isolated delusion, either of infidelity or of erotomania. The paranoid structure of the delusion was quite clear in these cases. These patients were otherwise well-ordered in their everyday life; it was relatively easy to bring them to at least an intellectual doubt of the validity of their delusions, and some of them quickly surrendered them.

---

[10] This group of Preschizophrenias was diagnostically of great interest to us' because the diagnosis here has prognostic, and in a sense preventive, significance· To deal with these cases as with a neurosis constitutes a misrecognition of the severity of the disorder. The unusual "psychological-mindedness" of the Over-Ideational Preschizophrenics is amenable to swift steps in therapy and interpretation; and these only facilitate the breakthrough of the schizophrenic process, rather than fortify the patient to withstand it.

[11] In all except two cases, Nos. 12 and 14.

The justification for lumping all these cases together is the similarity in the basic dynamics of their pathology, despite the fact that in one group it comes to expression as an overt character-formation which appears as paranoid, in another as a short-lived psychotic break, in still another as an isolated delusion. The statistical treatment will have to be regarded with reservations resulting from the variety of syndromes in this group.

5. The Depressive Groups. In classifying the group of depressives, we excluded all those cases where alternating elation and depression appeared to be present. In the type of institution in which this work was conducted, cases of alternating manic and depressive phases are extremely rare; and in the three years of this study there were only three such cases. Two of these cases were identified beyond a doubt as schizophrenics, and the third showed at least marked schizophrenic-like features. Hypomanic conditions with an underlying depressive background, which is probably always behind the hypo-manic pseudo-elation, are somewhat more frequent; and we saw five cases of this type in three years. We decided to forego analysis of the eight cases.

Thus, we were left with a group of 33 Depressives. As already mentioned, depressions with clear-cut schizophrenic background were placed with the schizophrenias. The circular depressions were eliminated. It will be obvious, from our attitude to nosology as indicated thus far, that we had no use for such a diagnosis as "manic-depressive psychosis, depressive state"—so frequently assigned to a depression which is clearly psychotic, whether a recurring depression, with no elated phase in the interim, or whether a depression which is a single protracted period. We excluded all cases where clear-cut arteriosclerotic or other palpable organic signs were present.

The group divided into two main subgroups. One of these was psychotic, the other was not. Wherever delusions were evident, and feelings of worthlessness and of having sinned, accompanied by extreme agitation and/or psychomotor retardation, became paramount, the classification into the psychotic subgroup was made (*Depressive Psychoses*). This psychotic subgroup of 17 cases was subdivided further into two parts. We split off a subgroup of 7 cases, all in the involutional age, the precipitating events in which were not very clear-cut and/or whose nature showed that declining "vital powers" made some difficulties, which would previously have been easily surmounted, the precipitation-point of the psychosis. This group was designated the Involutional Depressives. We excluded all cases in which paramount arteriosclerotic changes appeared to be underlying the disorder; but we did not exclude all cases where arteriosclerotic changes were present in a degree consistent with the physical status of persons in this age group. Drawing this line was a rather delicate task, but we feel satisfied that the group includes no case which might be designated as a "psychosis of organic etiology". The group of the remaining 10 cases will be referred to as Psychotic Depressives. This group is homogeneous insofar as the presence of a depressive psychosis is concerned, but there are 3 cases with some paranoid-like coloring, 2 cases with some obsessive-like coloring, and 1 case with schizoid coloring. We felt justified in keeping this group, because experience with tests shows—and this is true for most of the psychological tests which we used—that psychotic depression has a paramount effect on test performance which overshadows the effects of accompanying clinical features.

The second main group of depressives was the *Depressive Neuroses*, who totalled 16 cases. This group was also split into two subgroups. 7 cases were clearly neurotic: that is to say, except for the severe depressive mood and general hopelessness, tearfulness, and desperation, no ideation was present which even remotely resembled a delusion of worthlessness or sinfulness. This group will be referred to as the Neurotic Depressives. The other 9 cases did not display clear-cut delusions, but showed an ideation pervaded with depressive motifs, accompanied by either a degree of agitation or of psychomotor retardation which definitely distinguished it from the Neurotic Depressive group. These 9 cases were distinguished from the Depressive Psychoses by the fact that clinically they could not be considered "psychoses" because of the lack of delusions, the retention of contact with reality, and amenability to rapport—although some irrational features were present in their ideation. The clearly neurotic group of 7 cases will be called here Neurotic Depressions; the group of 9 cases just discussed will be referred to as Severe Neurotic Depressions.

It must be clearly recognized that the nosological categorization here was based partly on the depth of the depression and partly on the extent of the departure from reality, these being the features which it can be expected will be reflected well in the tests. Thus, this exemplifies the point made in the introduction to this nosological section: we did not make a nosological categorization to have the cases fall well, and the diagnostic signs come out well in the statistical appraisal of the test results; but we did attempt to make nosological categories so that one might reasonably expect the tests to be able to differentiate between the groups.

6. The Neurotic Groups. In this group we have 62 cases. As already stated, we excluded all cases which may have been neurotic but whose general distortion of character stamped them as primarily character disorders with neurotic symptoms. We also excluded cases of addiction, even those which showed a sufficiently clear-cut symptomatology to have been classed with one of the neurotic groups.[12] No difference was drawn between drug addicts and alcoholics; both were excluded. Cases of a borderline nature, due either to their paramount schizoid characteristics or to their paramount mood-disorder as manifested in depressive mood-coloring, were excluded from the neurotic group and were classed either with the Preschizophrenics or with the Neurotic Depressions. Only two such borderline cases were included in the neurotic groups because of their paramount and clear-cut neurotic symptomatology, though they were included also in other groupings.[13] We felt justified in including these with the neurotic groups because, although the other features were also significant, the neurotic features were so clear-cut that they could be reasonably expected to show up in the tests.

---

[12] **There was one exception to this, Case 10 of the Anxiety and Depression group.**

The neurotic group is subdivided into cases of Hysteria, Obsessional-Compulsion Neurosis, Mixed Neurosis, Anxiety and Depression, and Neurasthenia.

It is only natural that the two most easily spotted and best-defined groups of all the neuroses were the Hysterias and the Obsessive-Compulsives. The former constituted 19, and the latter 17, of our cases. Of the Hysterias, 11 cases were well-differentiated and were spotted immediately by the presence of conversion symptoms only, or of conversion and phobic symptoms. In all the cases of conversion symptoms, careful medical and neurological examination excluded the possibility of the presence of organic disturbance, and clearly demonstrated that these symptoms were bodily expressions of emotional conflict. It should be noted here that no "psychosomatic conditions" were accepted as "conversion symptoms". We adhered to the restriction that only bodily symptoms expressive of emotional conflict in the motor or sensory sphere were to be considered "conversion symptoms". Thus, neither psychosomatic disorders such as gastrointestinal distress, colitis, and ulcers, nor cardiovascular symptoms of emotional etiology have been included in this group. Nor were the general somatic expressions of anxiety considered here as conversion symptoms.

Less clearly defined were Cases 12 to 19 of the Hysteria group. In these cases hysterical character formation, mostly with minor conversion symptoms and hysterical behavior, was the criterion upon which diagnosis was based. The main features of hysterical character were impulsiveness and childish histrionic behavior. We felt justified in grouping these two kinds of cases together in the Hysteria group because their psychodynamics were essentially similar, they showed the ready transference and emotional warmth of Hysterics, and their course in treatment was in general favorable. The reader will note, if he reviews the general table of presenting symptoms, that no case of "grand hysterie" was encountered by us, in pure form, in three years. Perhaps Case 18 most approximates it.

---

[13] No. 6 of the Neurasthenics is also No. 8 of the Severe Neurotic Depressives; No. 9 of the Hysterics is also No. 14 of the Paranoid Conditions.

The Obsessive-Compulsives also present a great variety. Of the 17 cases there were only 2—Cases 10 and 11—which had clear-cut predominant compulsions. Cases 3 to 9 showed a relative predominance of obsessional symptoms, though even here Case 5, Case 7, and to a certain extent Case 8, showed significant compulsion symptoms also. There were two cases in which the obsessional and the compulsion symptoms were of equal weight: these were Case 1 and Case 2. In Cases 12 to 17 the diagnosis was based on the presence of obsessive ideas which, however, were not crystallized into clear-cut obsessions, in the sense of ego-alien ideas constantly recurring in consciousness. In all these cases, the obsessive ideas were embedded into a character formation generally obsessive, over-meticulous, speculative, doubt-ridden, and consequently paralyzed for action. The differential diagnosis from the Over-Ideational Preschizophrenics was clear; these cases were not schizoid personalities, and the wealth and variety of pathological ideation nowhere approximated that of the Preschizophrenic group.

Case 11 could have been classified also with the Preschizophrenic group, but the compulsive features were the more marked. In spite of the fact that four different variants appear in these 17 cases of Obsessive-Compulsive Neuroses, the prominence in each case of the clinical and psychodynamic features characteristic of the type of personality which develops obsessional or compulsion symptoms, seemed to justify lumping these cases together.

By Mixed Neuroses we do not mean neuroses whose symptomatology is sufficiently unclear not to allow for categorization under any of the well-established neurotic categories. Such a usage appeared to us neither consistent with the idea of a systematic nosology, nor conducive to the statement of any results concerning test-diagnostic indicators. Thus, we excluded every case which showed so complex a symptomatology that no major trend or classificatory evidence could be established. We classified as Mixed Neuroses only neuroses in which both hysterical (that is to say, mostly phobic) and obsessive-compulsive (that is to say, mostly obsessive) symptomatology were present. The group is relatively homogeneous, with perhaps the exception of two cases. Case 2 has a syndrome of "anorexia nervosa", a conversion-like symptom which, in the absence of obsessional-like features, would have put the case into the Hysteria group. Nevertheless, the distinct character of mixed phobic and obsessive symptomatology warranted inclusion in the Mixed Neurotic group. Cases 9 and 10 showed some schizoid trends, Case 6 depressive characteristics, and Case 4 showed depressive as well as schizoid features; but in all these cases, these features were overshadowed by the characteristics upon which Mixed Neurosis was diagnosed.

The Anxiety and Depression group is one which is absent from the usual nosological categorization. This group consists of cases of rather successful, rigid, compulsive people who, under a strain and stress which in the case history was easily identified as the precipitating event, "decompensated" into a condition characterized primarily by an intense anxiety and secondarily by a depressive mood. Inasmuch as none of these compulsive personalities decompensated into an obsessional or compulsion syndrome, nor developed anything that might have been characterized as conversion symptoms, we were obliged to put them into a special category to indicate the main symptoms, anxiety and depression. They were differentiated from the Neurotic Depressions in that not the depressed mood, but rather the anxiety state with depressive coloring, was outstanding. In some nosological categorizations there appears a category called "anxiety state". Our Anxiety and Depression group is distinguished from these "anxiety states", into which category all kinds of obscure conditions with predominant anxiety are cast. Our Anxiety and Depression group is so named in order to indicate that the depressive characteristics were in all cases weighty. Of all the neurotics, except for the Neurotic Depressions, this group showed the most pronounced depressive characteristics.

The cases grouped under Neurasthenia showed as presenting symptoms a general weakness with vague bodily complaints, mild hypochondriasis, and a flattened depressive mood with a generalized inadequacy and inertia. None of these cases could have been justifiably diagnosed as straight "hypochondriacal psychosis"—although this diagnosis had to be considered—because in all these cases contact with reality was retained.

In all these groups of neuroses, it is clearer than in any other category that current psychiatric nosology has many arbitrary and inadequate criteria in its groupings. It is also clear that the results achieved in the analysis of our tests for their diagnostic indicators will have to be considered as minimal results. They are minimal in the sense that we have had to lump together a number of variations of the same basic maladjustment, which necessarily resulted in less clear-cut statistical findings than would have been the case had we had more cases and been able to work with groups having less internal variability. If these minimal results turn out to be significant, their actual value in practice will be in excess of our claims for them.

Clinical experience will allow the examiner, in cases which are classified on the basis of the general indicators demonstrated in the following discussions, to point out the presence of other diagnostic indications as well; and thus to build a detailed description of the specific features which distinguish that individual from other more or less typical cases, or from other variations within the same diagnostic classification. Thus, no prevalence of diagnostic signs characteristic of a nosological category should prevent further thought about the case. Minor indicators of trends demonstrated to be present in other categories should be used to understand the specificity of the case, and to predict the presence of other—even though minor—symptomatology; and should thus enable the examiner to build up a relatively rich picture of the individual case.

7. The Control Group. The control group consisted of 54 randomly-chosen members of the Kansas Highway Patrol. Perhaps our most delicate task was the categorization of this group. In spite of great efforts, the case material obtained is by no means as complete as the material of our clinical cases. The basis of classification of each case was the information and the impressions which the psychiatrist obtained in an hour interview; the social and developmental history which the social worker obtained in an hour interview; and the discussion of each case with the Chief of the Highway Patrol, through whose courtesy these patrolmen were made available for examination. Appendix I summarizes the essential data we obtained concerning these patrolmen.

We have attempted to establish an adjustment rating of 1 to 3 for these patrolmen. The adjustment rating 1 was given to cases who, despite occasional difficulty, anxiety, or mood swings, were nevertheless well-contained individuals who did their work satisfactorily, made a favorable impression in their social contacts, and revealed neither a history indicative of pathology nor behavior in the course of examination indicative of maladjustment. Those cases which showed a history of instability, childhood difficulties, neurotic symptoms whether physical or subjective, extreme swings of mood, much impulsiveness, or strong withdrawal tendencies, were considered either borderline or maladjusted cases; for the borderline cases the adjustment rating 2, and for the maladjusted cases the adjustment rating 3, was given. The fact that a patrolman did his job well was not considered a contra-indication against rating him in group 2 or 3. We were aware that all these persons were within the range considered "normal", and showed some kind of adjustment. This adjustment as patrolmen may have been, in many cases, an effort of sublimation or the choice of a mode of life where their restlessness or aggressions found a socially acceptable form of expression. Many of these patrolmen were characterized by a general restlessness to which they gave expression in relating their history and problems; they said that as soon as they were obliged to stick to one place, and were unable to go out roaming on the road, they became restless, impatient, aggressive, irritable. Others demonstrated that the patrol gave them an opportunity to act out or sublimate their aggressions by preventing others' aggressive acts. Thus, good work-record in the patrol was taken into consideration, but it alone did not preclude an adjustment rating of 2 or 3. However, poor adjustment to the patrol and its work, lack of "esprit de corps", was in general considered a sign of borderline adjustment or maladjustment. There were only a few isolated instances in which dissatisfaction with the patrol was supported by reality considerations, and could not be considered a sign of maladjustment. There were a few cases of obvious neurotic symptomatology which, though allowing for successful work, was nevertheless considered sufficient reason for a rating of 2 or 3.

The adjustment ratings were based also on subratings assigned for anxiety, depressive mood, schizoid trends, inhibition and impulsive characteristics, which are itemized in Appendix I. Before discussing these special points of consideration, we must make a general statement concerning the Patrol.

The main difficulty in establishing adjustment ratings or other categorization of the Patrol was rooted in the fact that a great percentage of these patrolmen came from farm environments, and if compared with a city population would have to be considered in some degree schizoid. The designation "schizoid" is, in a sense, incorrect: nevertheless, the limited range of interests, the tendency toward some degree of withdrawal, the unusual lack of colorfulness in most of these cases—though they were amiable and efficient persons, on the whole—were striking. Whether this is a characteristic of the population of a farm state such as Kansas, or is rather a characteristic of the type of person who chooses the profession of highway patrolman, is an open question. That it does not subtract from the efficiency of the Kansas Highway Patrol is obvious on the basis of its record. So far as educational background and cultural interests are concerned, our control group cannot equal our clinical group, whose standing in these respects is high. The reader might ask why *this* control group was chosen. Control groups comparable to our clinical population are not available. Even if one should pick out a group in an endeavor to match this clinical population, the variety of the material on the one hand, and on the other the paucity of information available from individuals not under psychiatric care, would not justify a comparison between such a control group and the clinical group. It is true that the Highway Patrol population is culturally quite different from our clinical group. It is true that much desirable data were not available from the patrolmen, partly because they did not have the patient's feeling of confiding in the physician, partly because they were somewhat wary lest information given by them find its way back to their superiors. Nevertheless, in the Patrol we obtained a relatively homogeneous population, the nature of which became relatively clear to us; and any comparisons with the clinical group were made with an allowance for the specific nature of the control group.

The psychiatrist in his examination looked for overt, palpable signs of anxiety. Restlessness, hedging, sweating—the obvious signs of anxiety in a clinical examination—were the main indicators. In the case histories, and in a special conference with the Chief of the Highway Patrol, the inquiry made a point of obtaining historical evidence of anxiety. On the basis of these findings, scores of anxiety were assigned: anxiety$_0$ indicated no observable anxiety; anxiety$_1$ indicated some, and anxiety$_2$ indicated a greater, degree of anxiety. No doubt a subjective element is present in these evaluations. But they were made by the psychiatrist in the presence of the senior author and one of his assistants, and the subject-matter of evaluation was the written record of the psychiatrist's interview, the written record of the social worker's interview, and the written record of the conference of the three persons who established the anxiety ratings with the Chief of the Highway Patrol.

Ratings of 0, 1, and 2 were also allotted for presence of depressive mood. The basis again was behavior in the interview situation, historical material, and the description by the Chief of the Highway Patrol.

Ratings were similarly given for the degree of inhibition, for the degree of impulsivity, and for the strength of schizoid trends. All five ratings, together with the history of past adjustment and adjustment to the patrol, were considered as the basis for the final adjustment rating of 1, 2, or 3. No mechanical or arithmetical key for such rating was established. We evaluated them simply in three classifications. The reader must bear in mind that to decide the degree of anxiety, schizoidness, or depressiveness of a person within the normal range is a delicate matter; and whatever results may be obtained by the quantitative comparison of the test patterns of the groups so classified will be minimal results. Qualitative evaluation of each case might have yielded more striking results, although they could not have been summarized as clearly and simply as statistical results.

We believe that such considerations of the cultural background and psychological make-up of the so-called "normal" control group is indispensable for any kind of meaningful research. Every "normal" man contains within himself, to a greater or lesser degree, trends toward the various clinical maladjustments. It is the duty of any investigator who uses "normals" in his study, to discover and examine these trends, and to take account of them in his research. It has been our experience, as will be seen in the subsequent evidence, that the mild manifestations of maladjustment in normals express themselves in test performances by indicators similar to those seen in pathological cases. One must go beyond asking, What do "normals" do on this test? One must also ask, What does this type of normal and that type of normal do on this test? Psychological tests will prove to be extremely sensitive instruments, once this question has been asked and the search for an answer begun.

F. THE PLAN OF PRESENTATION

A statement of the organization of these volumes is in place here. Our material is divided into two volumes. The first volume contains the material of the intelligence tests (Bellevue and Babcock), and the tests of concept formation (the Sorting Test and the Hanfmann-Kasanin Test). The second volume contains the material of the tests of ideational content (Word Association Test and Thematic Apperception Test), and a diagnostic personality test (Rorschach Test). The Szondi Test, which we used in our work, will not be reported here since it is at present not available for distribution on the American market, and we did not feel justified in giving it equal place with the other tests. The volumes also contain appendices giving clinical data on our subjects, tabulated data of all tests of all subjects, and a brief history and bibliography of each test.

Each of the sections contains a description of the tests dealt with therein. Following the description of the test, each section advances the psychological rationale of the function underlying achievement on the test. Where the test consists of several subtests, the rationale of each is specifically discussed. The place and importance of such a psychological rationale in testing has been discussed already in detail above. Each of the sections contains a description of the general method of its administration, as well as specific consideration of such techniques and minor features of administration as proved to be especially useful in the type of diagnostic approach used by us. As stated, we do not intend to duplicate the existing manuals and other descriptions of the tests; but we feel that we should not shirk such descriptions of the tests and of their administration as will dispel the feeling that any of these tests requires a complicated technical knowledge. It is our view that all of these test procedures are simple in their technicalities; and accordingly an attempt has been made to present the minimum of technical information necessary.

On the other hand, it is our conviction that as a prerequisite to such clinical work, a knowledge of clinical syndromes and their dynamics is as much underestimated as the technicalities of administering the tests are overestimated. It is our experience that persons who have the necessary knowledge of clinical syndromes and their dynamics find that the technical difficulties of the tests vanish as their experience with them accumulates. Further, the using of such tests will, for psychologists and psychiatrists of sufficient curiosity, instigate systematic thinking about clinical experience.

The discussion of administration is followed by a statistical analysis of the test results. In these statistical analyses we have followed six procedures.

1. We have attempted to print, as fully as possible, the raw data obtained on each of the tests.[14a] We felt that only this procedure can give the reader at least a partial opportunity to re-examine our results and to see for himself how all the actual patterns, demonstrated statistically, work out for the individual case. It is our conviction that authors of clinical psychological publications are obliged to present such raw data if their results, as statistically proven, are to become part of the used armamentarium of the clinical psychologist.

2. In our statistical analysis we have used two measures to differentiate our clinical group: first, the "t-test" of the significance of the difference between means; and second, the "Chi^2 test" of the significance of differences in case distribution.[14b] This first measure was used in two ways. In some cases we directly compared the means of two different groups. In other cases we tested the significance of the difference of a mean score from a hypothetical mean of zero. This latter measure proved of especial importance in studying deviations from a hypothetical mean, and in studying the diagnostic potency of an indicator. The Chi^2 test of the significance of differences in distribution we felt to be especially important in making the evaluation of results clinically meaningful and directly applicable. The computation of Chi^2 involves the setting up of limits, and the representation of the percentage of cases in each group which falls between various limits. Such representation is a direct statement of how one may expect the cases of a clinical group to distribute in regard to degrees of presence of an indicator.

3. In our statistical comparisons of groups we have sometimes used single groups and sometimes combined groups. Two rules have been followed in regard to combining groups: (a) We have combined only groups which were included under the same general nosological category: Schizophrenics, Depressives, Neurotics, etc. (b) We have combined groups only when they had similar distributions: that is, when Acute, Chronic, and Deteriorated Schizophrenics all showed the same type of distribution, they were combined under the general heading *Schizophrenics*. Such combinations bring into clearer relief the differences in test performance of the major clinical groups, and allow for general theoretical and diagnostic conclusions.

[14a] See pp. 515–547.

[14b] Inasmuch as our clinical groups were small, in most of our statistical computations we used corrections for small samples. When working with mean scores, we used "Student's *t*"; when working with Chi^2 we used Yates' correction.

4. We have used the following criteria to evaluate our statistical results: any difference which was significant from 10% to 20% was considered to represent a *mild trend* toward a significant differentiation; any difference which was significant from 5% to 10% was considered to represent a *strong trend* approaching a significant differentiation; any difference which was significant from 2% to 5% was considered *significant;* and any difference at or below the 1% level was considered to be *highly significant.* Here the significance percentages refer to the number of chances in a hundred that the obtained differences were fortuitous results.

5. Graphs were presented in illustration of our statistical results wherever it was felt they would make clearer the relationship between performances of different groups or between performances of the same group. Many of these graphs are line-graphs; although it might have been more correct to have used bar graphs, since the numbers graphed were generally averages or percentages of cases, we felt that the comparison of different groups was facilitated in some cases by a continuous line joining the ordinates which represented the averages or percentages.

6. We have used the following abbreviations for the nosological categories in the graphs and tables:

Unclassified Schizophrenia, Acute : U Sch A
Unclassified Schizophrenia, Chronic : U Sch Ch
Unclassified Schizophrenia, Deteriorated : U Sch D
Paranoid Schizophrenia, Acute : P Sch A
Paranoid Schizophrenia, Chronic : P Sch Ch
Paranoid Schizophrenia, Deteriorated : P Sch D
Paranoid Condition : P Co
Simple Schizophrenia : S S
Preschizophrenia, Coarctated : Pr C
Preschizophrenia, Over-Ideational : Pr O-I
Depression, Psychotic : DP
Depression, Involutional : DI
Depression, Severe Neurotic : DSN
Depression, Neurotic : DN
Hysteria : Hy
Anxiety and Depression : A & D
Mixed Neurosis : MN
Obsessive-Compulsive Neurosis : O-C
Neurasthenia : Neuras.
Patrol, Well-Adjusted : P (1)
Patrol, Borderline-Adjusted : P (2)
Patrol, Maladjusted : P (3)

G. FURTHER REMARKS

The multitude and variety of problems involved in this investigation may account for at least some of the shortcomings of these volumes. To systematize an accepted body of knowledge appears to be relatively easy; to describe or propound something radically new requires courage, but imposes less restrictions. Our task cannot be characterized as being solely either. We have attempted to weld a practical and meaningful unity out of many individually well-known phenomena and procedures. Neither novelty nor finality has encouraged us. The nature of the task has made the material to be dealt with too voluminous to afford a strictly clear picture of the interrelations studied. The study of many important relationships had to be deferred because of the limited scope of our task. Wherever possible, if the statistics speak clearly enough, we shall try to advance statistical proof for our views, derived from our clinical experience, on the psychological significance of item groups and their interrelations. We do not believe that "experience" is ever the last word in scientific endeavor; it is always followed by statistical verification, and finally by laws based on an understanding of the dynamics underlying the phenomena. The considerations to follow may not be at all new to many psychologists, and in their vagueness may be unattractive. However, we believe that to report as much of the experience as possible, and as much of the statistics as feasible, is better than to leave the questions untackled.

Perhaps the reason for not ascertaining certain important relationships lies much deeper. The representation in unequivocal terms, and if possible by statistical means, of interrelations of sets of data rooted in the dynamics of human personality, is confronted by the same difficulty as any appraisal of human personality. Though there is a continuity or "congruence" in all the data derived from each individual, each continuity contains unique features and patterns which defy inclusion in group statistics.

PART TWO

DIAGNOSTIC INTELLIGENCE TESTING

CHAPTER I

THE NATURE OF INTELLIGENCE

A. THE CHANGE OF PSYCHOLOGICAL CONCEPTIONS

The days are past in which an individual was presumed to have been born with a certain I.Q., which he bore throughout his life and died with. The Iowa studies[1] and others[2] have shattered the myth of the unchangeability of I.Q. The problem, "What is intelligence?", has inspired more efforts to waste paper than any other problem in psychology. In a volume of practical aims such as the present one, there is no place for a renewed discussion of this moot question, even if one should be tempted to tackle it again.

The division of mind into sensory, cognitive, and affective spheres is a matter of past theory in psychology. But to apply recognition of this fact to a number of outstanding psychological concepts—such as memory, thinking, intelligence—is still a matter of struggling through the present and dreaming of the future. Though every modern psychologist professes that the trichotomy mentioned is outdated, memory is still being dealt with in terms of association frequency or conditioning;[3] the psychology of thinking is still being dealt with by investigations of logics, such as those investigations referring to the rules of Mill;[4] and intelligence is still being dealt with chiefly in terms of I.Q.

We do not propose to advance a concept of intelligence proper to a psychology which disclaims the trichotomy of sensation, cognition, and affection. We shall limit ourselves to giving the view of intelligence which underlies our approach to intelligence tests.

B. THE DETERMINANTS OF INTELLIGENCE TEST ACHIEVEMENT

When a subject takes an intelligence test, his performance represents his efficiency of functioning then and there. This may or may not be an adequate sample of his general efficiency; or, in other words, of the intellectual assets potentially at his disposal. His present life-situation, or even the present testing situation, may temporarily encroach upon and diminish his efficiency. On the other hand, the store of intellectual assets potentially at his disposal is not necessarily a final and unchangeable characteristic. The environment in which he grew up, including home, region, and country, with its barrenness or stimulating character, had its influence. The degree of schooling and the profession chosen may have expanded or constricted the development of the endowment and range of efficiency. An emotional or organic disturbance may have caused an arrest or setback of the level of efficiency. Thus, in the intelligence test performance, a number of influences interact, yielding the results obtained.

---

[1] See Wellman (30).

[2] See Stoddard (27).

[3] See Hilgard and Marquis (15).

[4] See Welch and Long (20).

If one wishes to use to greatest benefit the intelligence test record, he must make an effort to differentiate these influences as much as possible. In order to do so, we found it necessary to start out with a concept of "natural endowment"—that is, a potentiality unfolding in a process of maturation.[5]

In the course of the maturation process this potentiality does not remain unchanged. Its psychological environs are changing, and with them the dynamic characteristics of the "natural endowment" also change. By "psychological environs" we mean here the psychological mechanisms internal to the subject, not the environmental conditions which will be discussed soon. What we call here "psychological environs" and "natural endowment" are not two entities; the latter is merely a part of the former, and is differently named here only for the sake of contrast. Natural endowment is the hypothesized potentiality which is specifically considered to underlie what is called intellectual maturation.

The maturation process is one in which potentialities—among them "natural endowment"—become differentiated and crystallized. This differentiation process is sometimes referred to as the development of the Ego. In this process of unfolding, it becomes necessary for some personalities to keep a balance and adjustment by tending to avoid acquisition of new knowledge. Other personalities find it necessary to acquire knowledge, as their way of coping with new problems encountered in the process of unfolding; and some try to acquire more *concrete* knowledge, while others try to achieve more *abstract* knowledge. The psychological processes occurring in this differentiation are known clinically: repression and withdrawal in the refusal to acquire knowledge; intellectualization and rationalization in the over-emphasis on acquisition of knowledge. Repression and its rôle in Hysteria, withdrawal of interest as seen in Simple Schizophrenics, intellectualization and its rôle in Obsessive-Compulsive types of disturbances, are psychiatric commonplaces. These are but a few examples of the vicissitudes of "natural endowment" in the course of the maturation process. Whether the individual choice among these vicissitudes is already to some extent determined by the type of innate endowment, is as yet a moot question. We do not know whether the inclination to repression rather than to intellectualization is or is not a native individual characteristic.

---

[5] For a view in some respects similar to the one here presented, see Stoddard (27).

But there can be little doubt that there is a constant interaction of the "natural endowment" and the conditions of the maturation process. A consistent follow-up of these clinically known types of development, in terms of experimentally and statistically demonstrated relationships, might serve as a basis for a psychology of thinking, and for diagnostic work with these disturbances, more satisfactory than our present procedures. A macroscopic view of the patients' thinking and methods of living has usually been correlated with their disturbance and maladjustment. But a microscopic analysis of this thinking has not been compared with the *type* of maladjustment into which different "types" of personality are prone to decompensate. One of the ideas behind our work in intelligence testing was to trace the relationship of these general psychological reaction "types" and psychodynamic patterns to the most minute test findings. The authors realize that they have made only a short step toward this aim, but they feel that this is one of the leading ideas which every clinical examiner must keep in mind if diagnostic and meaningful intelligence testing is to replace mechanical intelligence testing.

The maturation process should be viewed as guided, restrained, or fostered, by the environmental conditions—natural, cultural, and interpersonal "wealth" or "poverty"—which may be justly called "educational environment" in contrast to formal schooling. But educational environment crystallizes into schooling; and the influence of schooling is, in some individuals, sustained in above-average cultural interests which in turn, like schooling, contribute to a systematic crystallization of intellectual assets. Endowment, degree of maturation, educational environment, schooling, cultural predilection, are those factors whose influence on intelligence must be assessed if the clinical psychologist is to understand the makeup of his subject.

But this is not all. He must know whether, maturation once achieved, there has come about an arrest of development or a setback; and, if not, whether there is present a temporary inefficiency encroaching upon and impoverishing the subject's test performance.

In the analyses presented in these pages we shall attempt to demonstrate that the different types of maladjustment tend to have different distinguishable and recognizable impairments of test performance. It will be shown, however, that certain deficiencies due to the educational environment, or assets due to cultural predilections, may cloud or exaggerate some of these diagnostically distinguishing features of impairment. Cultural differences and educational background will—in spite of the generality of types of impairment in the intelligence test claimed here to be characteristic of different psychiatric disturbances—still have a rôle in the evaluation of our material and in clinical work, especially when the question is one of differential diagnosis. Before all the diagnostic inferences from the Bellevue Scale have been made, the examiner must ask himself whether or not there is an educational, environmental, or cultural factor which may account for any part of the otherwise diagnostic signs, thus invalidating or making them questionable. It is for this reason that the tester must obtain a minimum of information about the patient before he can rely on his diagnosis of test findings alone. In our practice, name, age, profession, church affiliation, schooling, present and childhood residence, occupation of parents, marital and familial status proved to be that minimum of information necessary and useful in evaluating the intelligence test results.

C. THE APPROACH TO FUNCTIONS UNDERLYING TEST ACHIEVEMENT

When an attempt is made to infer from the intelligence test responses of the subject whether one is dealing with a temporary or long-standing impairment of efficiency, or a good efficiency and poor endowment, or good endowment and a lack of education and schooling, and so on, one hits upon new problems. We shall proceed by setting forth the premises we found to be necessary in attempting to obtain answers to these questions from the test records.

First, we found that one must consider not only every subtest score, but every single response and every part of every response, as significant and representative of the subject. Naturally, many of the intelligence test responses are highly conventionalized; and that a subject knows who was President of the United States before Roosevelt merely adds to his general score. But where the response deviates from the conventional, the deviation does not merely fail to add to his score; it must also be considered as a characteristic which may give us material toward the understanding of the subject. We shall illustrate this point when discussing one by one the different item groups of the Bellevue Scale and the Babcock Test.

Second, we found that one may gain some understanding of the subject by comparing the successes and failures on a given type of test item. Thus, if a subject knows how many pints there are in a quart, but does not know what the Koran is, this will give us merely an idea of his range of information. But if he knows what the Koran is and asserts that a quart has four pints, we must consider the presence of a temporary inefficiency; and if he insists that the capital of Italy is Constantinople or that the Vatican is a robe, psychotic maladjustment will have to be considered. Examples and a statistical basis for similar inferences will be given later.

Third, we found that the relationship of the score of one subtest to the scores of other subtests is also representative of the subject. Thus, if a subject demonstrates that he possesses excellent Vocabulary and Information, but is very poor on Comprehension, we must conclude that he is not able to utilize to a full extent in life-situations his verbal facility and general knowledge, and we will be justified in considering that we deal with a case of impaired judgment. Again, we shall have to defer further illustrations of this point to a detailed discussion.

Fourth, we found that the relationship of all the Verbal scores to all the Performance scores is significant of the makeup of the subject. Thus, a high Verbal but low Performance score average indicates the possible presence of depression.

Fifth, we found that the data to which the above four points refer must be considered in the light of findings of tests other than those of intelligence. Thus, badly impaired intelligence test achievement has a different diagnostic implication if the Rorschach Test indicates a rich endowment or a poor endowment.

In general, one might say that this approach to intelligence testing requires a very different attitude toward tests than does routine intelligence testing, which hinges upon correct appraisal of whether a response is to be considered passing or failing. This approach implies requirements which may be condensed into two points:

(a) On the part of the tester, it requires a great deal of attention to any type of deviation from the usual run of test performances. Routine performance on tests reflects degree and ability for cultural compliance; deviation from it reflects the individual personality in question. Thus, the response, "Wheeled vehicles for transportation on land", to the question, "In what way are a wagon and a bicycle the same?", obtains full credit; but its deviation from the usual responses, its over-exactness and relative redundancy, should raise the question in the examiner's mind, "Is this person really as doubt-laden and over-meticulous as this response indicates?" One such response will not give a personality description, nor will it establish beyond doubt even a single "trait". It will, however, require the examiner to develop a personality description, first from the rest of the intelligence test and later from any other test at his disposal, which will satisfactorily explain why the test item was responded to in a manner so basically deviating from the average run of the responses.

(b) The other requirement is not limited to the individual tester, but is pertinent as a warning to clinical psychology in general: reports stating, for instance, that "the subject has good Information but his Digit Span, especially Digit Span backwards, is very poor", are psychologically meaningless, as long as the significance of a poor Digit Span for the personality makeup remains unexplained. Many have considered poor Digit Span to be a sign of poor memory; others have tried to establish the factors involved in good or poor performance on Digit Span by means of factor analysis. The former explanation was no explanation; neither the relation of Digit Span to memory, nor the dynamic significance of memory and its impairment, was clarified. The latter explanation yielded a number of statistically established "factors", of which neither the real existence nor the dynamic significance was known. It may even be suspected that the basic assumption of factor analysis—namely, to search for independent factors—is in sharp contrast with the basic tenets of dynamic psychology, where no factor can be considered as independent of the general dynamics of the drama of psychological happening.

There are several reasons why we know so little about the psychological functions involved in the performance of simple tasks of the type included in intelligence tests. The influence of the trichotomy of sensation, affection and cognition upon psychological thought is one of the historical reasons; the effort to correlate stimulus and response in investigating behavior, and neglecting the processes that occur *between* stimulus and response, is another; the enormous and forbidding complexity of functions involved in these apparently simple performances is a third. As far as concerns the failure of intelligence testers and clinical psychologists to investigate the psychological processes in question, it appears reasonably sure that although *they* were the ones to raise these problems, their failing to contribute more toward solving them was in great part due to the nature of that intelligence test which was most widely used and which served as a paradigm for most other intelligence tests—namely, the Simon-Binet, or rather its American version, the Stanford-Binet. This is a test in which the items are distributed over mental age levels; many items are included more because, in the standardization population, they reliably differentiated between successive age groups and were easily scorable, than because the psychological functions underlying achievement on them were understood and considered sufficiently important to warrant their inclusion. Though attempts were made[6] to group the items of the Stanford-Binet into consistent groups referring to the same psychological function or group of functions, such attempts did not gain general recognition. Because the items of the Stanford-Binet were chosen and grouped on the basis of ease of scoring and statistically demonstrated capacity for differentiating age-levels, it is no wonder that attempts to achieve some grouping of the items according to their psychological meaning were unsuccessful. As a consequence of this, the evaluation of the clinical significance of success and failure dealt with the problem of how many age levels successes and failures were distributed over. The quality of the successes and failures was not systematically investigated. Quantitative measures of scatter of success and failure proved to be in general non-differentiating.[7] Because of the difficulty of systematic investigation of the functions involved in these successes and failures, no psychologically-meaningful theoretical rationale of the functions involved in the test performance developed; and the clinical evaluation of the meaning of the successes and failures was based on "hunch" or "intuition".

---

[6] See e.g. Roe and Shakow (25).

[7] See Harris and Shakow (14).

Because of these difficulties in the Stanford-Binet, we sought intelligence tests in which the items were chosen and grouped to be relatively homogeneous in regard to the psychological functions involved, and the subtest scores of which were directly comparable. We have chosen the Bellevue Scale and the Babcock Test because they more or less satisfied these requirements.

CHAPTER II

THE BELLEVUE SCALE[1]

A. INTRODUCTION

1. The Plan of the Chapter. We chose the Bellevue Scale for the intelligence test of our battery. This choice was not dictated merely by the fact that the Bellevue Scale is the newest intelligence test standardized on adults, and the standardization work on which has been very careful; but more by the fact that it, of all the tests extant, meets to the greatest degree the two criteria we have set in the previous chapter for diagnostic intelligence tests: its subtests are relatively homogeneous item-groups; and the scores of all these subtests are expressed in one scale of equated and directly comparable weighted scores. The test offers the possibility for an inter-personal comparison of the subject's intelligence to that of the general population, as expressed in I.Q.'s; and it allows also an intra-personal comparison of the efficiency of the different functions underlying the achievements on the different subtests.

The plan of this chapter is as follows:

(a) In this introductory section we shall give: (1) a description of the structure of the test; (2) a description of the administration of the test; and (3) a statistical demonstration of the diagnostic significance and value of the most general features of the distribution of the weighted subtest scores, to be referred to here as "scatter".

(b) We shall devote to each of the 11 subtests of the Bellevue Scale a special subsection: (1) describing the subtest; (2) discussing the theoretical rationale of the functions underlying achievement on the subtest; (3) presenting an analysis of the items of the subtest to establish whether, to what extent, and for which groups, success or failure on single items can be diagnostic; (4) statistically analyzing the data on our clinical and control population pertaining to the subtest, in order to establish which clinical groups it differentiates between and to what extent it does differentiate between them. The summarizing section of the chapter will organize the diagnostic indications by which each of the clinical groups can be differentiated.

2. A Description of the Test. The Bellevue Scale consists of 11 subtests. The weighted scores of 10 of these subtests are used for computing the I.Q. The eleventh subtest is a Vocabulary test. The Bellevue Scale consists of a *Verbal* part containing five tests—Comprehension, Information, Digit

---

[1] Wechsler (28).

Span, Arithmetic, and Similarities; and a *Performance* part containing five tests—Picture Arrangement, Picture Completion, Block Design, Object Assembly, and Digit Symbol.

These two major divisions we found in our experience to contain further subgroupings. In the Verbal part, Comprehension, Information, and Similarities, with or without the added Vocabulary subtest, will be considered the verbal part proper; while Digit Span and Arithmetic will be shown to deviate considerably in nature from the others. In the Performance part, Block Design, Object Assembly, and Digit Symbol will be segregated, because in them motor-activity plays an essential and indispensable rôle; while in Picture Arrangement and Picture Completion, motor-activity is not essential to the performance.

In the Verbal part the only timed test is Arithmetic; on all the items of this there is a time-limit, and on two items the subject may obtain additional time-credit. On the Performance part all the subtests have time-limits, and on all except Picture Completion the subject may obtain additional time-credit. On the Comprehension, Similarities, and Vocabulary items, both full and half-credits can be obtained; no such provision is granted on the Digit Span, Arithmetic, and Information items. Picture Arrangement, Object Assembly, and to a slight degree Digit Symbol, allow for partial scores; Picture Completion and Block Design allow credit only for full accuracy of performance. On Block Design the time-allowance is quite liberal; on Picture Completion the allowance is somewhat narrow (15 seconds per picture).

The Bellevue Manual (28) gives detailed and explicit instructions for scoring, with adequate samples where the responses are verbal and thus of a great variety.[2] The specific scoring of each subtest we shall discuss in the following subsections of this chapter. The raw scores of the subtests, once obtained, are translated into weighted scores[3] with the help of a table. The raw scores and the corresponding weighted scores are entered in the summarizing table of the test blank. The Verbal weighted scores and Performance weighted scores are added separately, and the total of these two is also obtained. The I.Q.'s represented by the so-obtained Verbal, Performance, and Total weighted scores are then located in the respective I.Q. tables in columns corresponding to the age of the subject.[4] Special tables indicate the percentile placement in the total population of the I.Q. obtained and the name of the intelligence group (bright normal, superior, etc.) to which the obtained I.Q. belongs.[5]

---

[2] For the instructions and samples see pages 165–180 and 185–207 of the Bellevue Manual (28).

[3] See Table 37 on page 182 of the Bellevue Manual (28).

[4] For these tables see pages 221–224 of the Bellevue Manual (28).

[5] For these tables see pages 42 and 40 of the Bellevue Manual (28).

We have described these salient features of the structure of the Bellevue Scale above, in order that the reader may become somewhat familiarized with the type of material we shall deal with in this chapter. We wished also thus to indicate the variety of situations implicit in these subtests, which offer an opportunity to perform under conditions some of which are more, and some of which are less, favorable to the subject. The essential variations in the testing situation are found in the contrast between Verbal and Performance subtests, and between timed and untimed subtests. For instance, Depressives show special impairment on Performance and timed subtests.

We have given a description of the general scoring scheme of this scale, to indicate to the reader how simple this procedure is. We shall not give here descriptions of the subtests, because the reader will find these in the sections dealing with each subtest.

3. On Testing Technique. A description of some simple and yet salient features of the test-administration will be in place here. A detailed description of the general procedure of administration will be found in the Bellevue Manual (28).

We used two technical aids in the recording of the test. In addition to the Bellevue Scale's printed record-blank, we used extra mimeographed sheets to allow for the recording of all the subject's verbalizations, and a description of his motor and other performances on the test, and of his salient behavior characteristics in the course of the test. We believe that only beginners need be warned that record-blanks are not to be used to record merely scores—however certain one may be of scoring, and however fast at looking up scores in the Manual—but rather for recording what the patient actually said and did. Regrettably enough, the present printed form of the "Wechsler-Bellevue Record Sheet" is conducive to the former practice, because of the inadequate space allowed for entering notes.

We not only recorded the weighted scores in the summarizing table of the Bellevue record blank, but also used a Scattergram as shown in Figure 1. This was done in order to impress upon ourselves vividly the relationships of the weighted scores to each other—that is to say, the intra-personal relationships of the different functions underlying achievements on the subtests. It is superfluous to emphasize that, after some preliminary experience, a graphically-represented profile is more conducive to grasping a pattern of weighted scores, and more automatically committed to memory, than a set of eleven numbers. The Scattergram card has for its horizontal axis the 18 weighted score units; and for its vertical axis the five Verbal, the Vocabulary, and the five Performance subtests, and the Verbal, Performance, and Total averages in this sequence. The Scattergram card then is used like a system of coordinates, on which a graph representing the weighted scores is drawn.

In introducing the test to the subject we always frankly state that it is an intelligence test. However, we emphasize that it is not for the intelligence-quotient that we give this test, but rather to obtain certain information concerning his problems which will be used to help him. In other words, we do everything we can to diminish the anxiety of the testing situation, even though knowing that all that can be hoped for is a slight decrease of tension in the patient. The same attitude prevails in the course of administration of the test, where the real achievements of the patient earn approval and the failures are eased over. (However, we do not tell the patient that his answer is correct when it is not.) We strictly follow Wechsler's advice to allow patients to finish whatever they start, even if they exceed the time-limit.

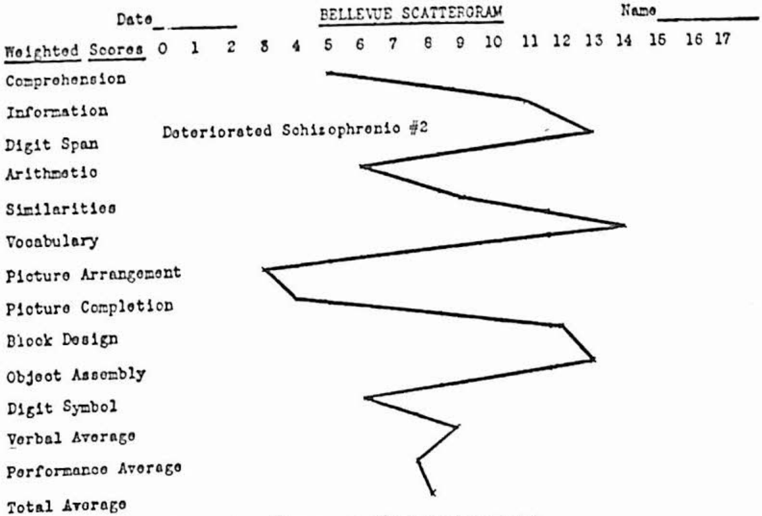


FIG. 1.—SAMPLE SCATTERGRAM

We made it a practice to adhere to the scoring standards laid down by the Manual; but after the score was established for a subtest or for an item of the subtest, if the subtest or item had something disquieting, peculiar, or vague about it, we always went back for inquiry. This inquiry had, naturally, no bearing upon the scoring itself, but frequently revealed the confusion hidden behind a stereotype. In the Performance subtests and in Arithmetic when failure was obvious, we gave help again and again, once the time was up, in order to see how much help the patient needed and also to determine whether any amount of help would be effective. Failure to benefit from such help must in general be considered a good basis for raising the question, Do we deal here with a psychosis?

Needless to say, we did not insist upon administering the entire test in one session, but rather took the patient's tolerance into consideration; we never continued testing a patient who showed either undue apprehension or fatigue.

Real efficiency in using these tests is obtained when the general scoring scheme is so committed to memory that scoring, translation into weighted scores, entering scores into the summarizing table and Scattergram, all can be done as the testing proceeds. The advantage of such procedure is partly in the time-gain, as against going over the test twice for scoring and diagnostic purposes; and partly in that it makes it possible, while the patient is present, to ascertain and clarify hazy points. Furthermore, if the weighted scores on successive subtests can be determined as administration of the test proceeds, patterns of scores begin to take shape; and these patterns can serve as the basis for diagnostic hypotheses which will direct the tester's attention to special features of the performance. Thus, if the score on Comprehension is much lower than that on Information—these being the first two subtests administered—the examiner can use this as a hint that psychosis is possibly present, and be on the lookout for aberrant performances on the remaining subtests.

B. THE CONCEPT OF SCATTER

The concept of scatter—that is to say, the relationship to each other of the functions underlying the individual's achievements on the different subtests—is the red thread of this chapter. Instead of the customary *inter-individual* comparisons, stressed by intelligence investigations and embodied in the concept of the I.Q. and percentile ratings, this chapter will stress the *intra-individual* comparison of functions underlying test performances as embodied in the concept of scatter. Accordingly, we devote a special section to the discussion of this concept.

1. The Definition of Scatter. The scatter is the pattern or configuration formed by the distribution of the weighted subtest scores of an intelligence test in general, and here of the Bellevue Scale in particular. The scatter is graphically represented by the profile graph called Scattergram.[6] The relationship of any two weighted subtest scores is subsumed under the concept of scatter; moreover the relationship of any single subtest score to the central tendency of all the subtest scores—however this central tendency is determined—is also implied. The definition of scatter as a configuration or pattern of all the subtest scores implies that the final meaning of the relationship of any two scores, or of any single score to the central tendency of all the scores, is derived from the total pattern of configuration. However, in the absence of a more satisfactory statistical method of analyzing patterns, we had no choice here but to analyze, on the one hand, the major scatter patterns by means of very crude summative[7] statistics; and on the other, to analyze in detail the amount and direction of scatter of every single subtest score, to determine to what extent it was characteristic of any clinical or control group. In some instances we also analyzed characteristic relationships of two subtests. The use of these methods may divert the reader's attention from the fact—which we cannot emphasize too much—that all the data and results obtained by this method can be used in the clinical process only in relationship to the total pattern or configuration. This pattern, when inspected on a scattergram, is a visually perceived configuration: the configuration can be one where all the weighted scores cluster closely around the central tendency; it can be one where the scores are distributed somewhat loosely around this central tendency; it can be one where if one score is far to the right of the central tendency, another is sure to be far to the left of it, and so on down the line; it can be one where, in spite of the general clustering, one score juts out far to the left or right; it can be one where the first five or six scores are high above, and the rest far below, the central tendency—and so on. It is from such visually observed distributions that our concepts of scatter were abstracted.

---

[6] See Figure 1, page 47.

2. The Assumptions Underlying Scatter Analysis. The first objection which we expect from many quarters is that we have attempted to investigate the relationship of subtest scores to each other, in different clinical and control groups, without equating our groups for age, sex, and I.Q. In order to meet such objections, it becomes necessary to state two basic assumptions underlying scatter analysis. (a) If one deals with differences of weighted scores, or differences of a weighted score and any kind of mean of scores, the operation of subtraction by which such differences are obtained cancels out the intelligence level which is inherent in the scores and in the means; and the differences thus obtained are directly comparable for any two individuals, though one be dull normal and the other very superior in intelligence. (b) The weighted scores and their central tendency represent the general position of the individual's intelligence in relation to the standardization-population of the test, and thus presumably in relation to the general population. On the basis of the projective hypothesis,[8] it follows then that the deviation of some of an individual's subtest scores from his central tendency of weighted scores—that is to say, from his general position relative to the total population—reveals some characteristic of his intellectual functioning and personality organization, whether this characteristic be an impairment or an uneven development of function.

---

[7] The term "summative" is meant here in the sense used by Gestalt psychology: the sum of elements rather than the pattern of a structured whole.

[8] See page 10.

These two assumptions are used in scatter analysis to get away from the intelligence level of the patient—which at the time may be unscathed, impaired, or totally disorganized—and to try to reconstruct out of the relationships of the single subtest scores, on whatever level the whole score distribution may be, the original level of performance and the specific character of the impairment; from these, conclusions can be drawn as to which diagnostic category the patient belongs in. Though the first assumption is considered here theoretically valid, some limitations of its practical application which are set by the nature of the Bellevue Scale must be stated. The assumption is that it makes no difference where the weighted scores of the eleven subtests of an individual are distributed on the 18-point weighted score range of the Bellevue Scale. This assumption is not entirely valid. The very fact that no lower scores than 0, and no higher scores than 17, can be obtained on the weighted score scale sets a limitation. We shall prove in the following discussion that great scatter is an indicator of pathology: however it must be noted that at either extreme of the weighted score continuum, the construction of the scale itself militates against great scatter. The feebleminded person, even if psychotic, will not be able to register a great scatter, because his intelligence level was originally poor; and an extremely intelligent person may still remain in the uppermost ranges, even though his intellectual efficiency is actually impaired. Lack of scatter in the uppermost and lowermost ranges thus cannot be considered, without further question, as a sign of normal scatter distribution. In fact, any scatter in these extreme ranges should be looked into with more critical caution than scatter of similar extent in the middle range. In our material, subjects with originally very low I.Q.'s are almost entirely absent, and low I.Q.'s are as a rule the results of impairment. Nevertheless, clinically it was not the lowering of I.Q.'s but scatter which proved to be diagnostically sensitive.

To establish statistically the relation of I.Q. to extent of scatter, we obtained the product moment correlation between the total I.Q. and total scatter rating[9] of our 261 clinical and control cases. The correlation was *−.23* with a standard error of *.06*. This correlation is significantly different from zero, which means that there is a significant but limited tendency for the I.Q. to be lower where the scatter is greater. This inverse relationship is easily understandable from two viewpoints: (a) great scatter in itself implies many greatly-dropping scores, which in turn imply a lowered I.Q.; (b) clinically we rarely find *many* greatly-dropping scores and at the same time an excellent achievement on the rest of the subtests. The fact is that the groups with many greatly-dropping subtest scores are those which have a general impairment on all subtests, and hence show a low I.Q. We found that in the four clinical groups[10] having the lowest average I.Q., 13 of 31 cases (42%) had extreme scatter, while in the rest of the population of 230 cases 44 (19%) had extreme scatter. A Chi^2 test of this difference in distribution, corrected for small samples, yielded a Chi^2 of 8.22, which is significant below the 1% level.

---

[9] For the scatter measure used in this calculation, see pages 67 ff.

In view of this inherent influence of scatter upon I.Q., it is striking that such a low correlation was obtained. This finding attests to the fact that for the most part the relation between scatter and I.Q. is an artifact of statistics and test construction; and that on the one hand, disparity of efficiency of functions underlying subtest performances as expressed in scatter, and on the other, intelligence level as expressed in I.Q., are intrinsically independent from each other. Thus interpretations of scatter may be made independent of the I.Q. of the subject

No other investigation of the I.Q. level of the various clinical groups was attempted in this study; the only data presented are the average I.Q.'s for each group.[11] In our clinical work, the I.Q. level proved to be of almost no diagnostic significance. Rather, the pattern of the scores of the various subtests which make up this total I.Q. was the diagnostically meaningful factor. These considerations are advanced to justify not matching our groups for I.Q.

The second assumption implies that the scatter is a pattern determined by the individual's development, and by his type of adjustment or maladjustment. If such scatter patterns exist, they must be expressions of powerful dynamic constellations which may be somewhat influenced, but not radically changed, by age or even sex; and consequently they should be statistically recoverable. This contention is justified by everything that present-day abnormal psychology and clinical, as well as theoretical, psychiatry have discovered. In this connection we must remind the reader that the standards and principles which this investigation has endeavored to meet are not the usual psychometric ones, but rather those of modern psychodynamics. At the same time, extreme age levels were generally excluded from our material, or grouped separately as in the Involutional Depression group.

3. The Scatter Measures. The task of representing and statistically analyzing patterns or configurations has not yet been satisfactorily mastered. To give a statistical treatment of patterns which will be clinically useful and meaningful is even more difficult. In attempting to cope with this task we were obliged to use several measures of scatter.

These were (a) the scatter from the Vocabulary; (b) the scatter from the

---

[10] Psychotic and Involutional Depression, Simple Schizophrenia, and Deteriorated Unclassified Schizophrenia.

[11] See page 515.

Verbal Mean and the Performance Mean for the Verbal and Performance subtests respectively; and (c) the scatter from what we called the Modified Verbal Mean and Modified Performance Mean.

(*a*) *Vocabulary Scatter.* The Vocabulary Scatter of a subtest is the difference between its score and the score on Vocabulary. Since the average score of Vocabulary is among the highest of the subtests for all our population, it will be obvious that most of these Vocabulary Scatters will be negative. In the following, a Vocabulary Scatter not specifically referred to as positive is to be considered negative. Inasmuch as negative scatter from the Vocabulary is usually a liability in the subject or group, and positive scatter from the Vocabulary is usually an asset, we were interested in obtaining the algebraic sum of the negative and positive scatters to ascertain whether assets or liabilities predominate in the subject or group. This algebraic sum will be here called Composite Vocabulary Scatter.[12] The Composite Scatter, if not referred to specifically as positive, is always negative in the following.

The empirical basis for adopting the Vocabulary score as one basis of scatter computation is that Vocabulary has long been known to be a fair representative of the intelligence level, and to remain relatively unimpaired by maladjustment. This observation is so general as not to need specific documentation; it served as the basis for the Babcock Test, and recently in Army and Selective Service work Vocabulary has been frequently used as the sole intelligence gauge.

In order to substantiate the observations concerning the nature of the Vocabulary subtest, we evaluated its stability and variability in our material. We established for our total material, clinical and control, the means of each of the subtest scores and their standard deviations. We found Vocabulary to be among the three subtests which hold up best, having a mean which is exceeded only by that of Similarities. We also found that the standard deviation of the mean of Vocabulary is the lowest among the standard deviations of the means of all the subtests. Only the standard deviations of the Information, Comprehension and Similarities means approach it, but all of these are significantly greater than the standard deviation of the Vocabulary mean, the differences being highly significant. Special Table 3 gives the pertinent data in detail.[13] These statistical data then substantiate the contention that Vocabulary is the least variable and one of the best retained of the subtests; thus it might well serve as an indicator of the original intelligence level, and as a standard of comparison for the other subtests. Accordingly, *Vocabulary Scatter measures the drop of efficiency of one or more functions below the hypothetical original level of the individual.*

---

[12] When studying group trends we did not use a group's average subtest scores to obtain this scatter measure, but rather computed it separately for each individual in the group. This made it possible to study the distribution of cases in different ranges of scatter, and thereby to avoid obscuring extreme individual variations by the use of averages. See page 57.

[13] See page 84.

One of the assets of Vocabulary Scatter is that the Vocabulary score and all the other subtest scores are integers: hence scatter measures are integers and are easily dealt with statistically. But one drawback of Vocabulary Scatter is that most of the scatter measures are negative, and this tends to give a somewhat one-sided picture of scatter in general.

Finally, although Vocabulary Scatter is invaluable in assessing a score distribution from the viewpoint of the original intelligence level, it is of little use in gauging the general spread of scatter over the scattergram. Our approach to scatter analysis is to consider the relation of all subtest scores to each other. Considering scores in relation to the Vocabulary level is only one aspect of this approach.

(b) *Mean Scatter.* The Mean Scatter is the difference between any subtest score and the average of all the subtest scores, excluding the scores of the Digit Span and Arithmetic subtests.[14] The so-obtained Mean Scatter is either positive or negative. A Mean Scatter not specifically referred to as positive should be considered here negative.

The Mean Scatter represents the variation of the subtest scores away from their central tendency. Therefore, while the I.Q. represents the subject's achievements in relation to the general population, and the Vocabulary Scatter represents the subject's achievement in relation to his own original highest achievement, the Mean Scatter most nearly approaches the stated aim of this investigation—that is, to represent the interrelationship of the different functions underlying the subject's subtest achievements.

The Mean Scatter as defined above was used only in the computation of Special Table 2, which presents for every subtest the statistical significance of each group's average deviation from its mean; and in the computation of the "Mean Scatter Ratings", to be dealt with later on in this section. Otherwise we used mainly a modified form of Mean Scatter to be discussed presently.

Accordingly, *Mean Scatter measures the relationship of single achievements of a subject to the central tendency of all his achievements.*

Using the Mean Scatter has two disadvantages. (1) The mean is usually a number containing decimals; thus the Mean Scatter measure will include decimals, and as a consequence the statistical treatment of the Mean Scatter is somewhat cumbersome. (2) The mean is not infrequently a dubious representative of the central tendency, especially in cases where one or two extremely low or high scores unduly displace its value. To mitigate this, in the computation of Mean Scatter we always used for the Performance subtests the Performance Mean, and for the Verbal subtests the Verbal Mean; thus we took into account the difference in vulnerability to maladjustment between the Performance and the Verbal subtests. To further offset the deficiencies of the Mean Scatter, we introduced the Modified Mean Scatter which we shall now discuss.

---

[14] The exclusion of these subtests was warranted by the fact that impairments of Digit Span and Arithmetic scores were so general in most of the clinical and control groups, that their inclusion would have vitiated the representativeness of the mean as a central tendency of the scores. See Special Table 2, page 83.

(c) *Modified Mean Scatter.* The Modified Mean Scatter is the difference between any Verbal subtest score and the mean of all the *other* Verbal subtest scores, including the Vocabulary but excluding Digit Span and Arithmetic; or the difference between any Performance subtest score and the mean of all the *other* Performance subtest scores.

By computing a Modified Mean Scatter—that is, by excluding from the computation of the mean that subtest score for comparison with which the mean is being computed—we avoid the possibility of the subtest score, when very much below or above the other subtest scores, lowering or raising the mean, and spuriously diminishing its Mean Scatter. The comparison of the Modified Mean Scatter and the Vocabulary Scatter indicates the relationship of the subtest score in question to both the subject's present and original achievements.

The only disadvantage of using this Modified Mean Scatter is that its measures generally include decimals and make for cumbersome statistics.

Accordingly, *Modified Mean Scatter represents the relationship of the achievement of the subject on one subtest to the central tendency of his other achievements, in the computation of which the subtest achievement in question is excluded.*

C. THE MAJOR SCATTER PATTERNS: RESULTS AND INTERPRETATIONS

This section will be devoted to the demonstration of the thesis that the scatter on the Bellevue Scale is not random, but follows definite rules and is diagnostically differential between kinds of clinical and normal groups. The aim of the statistical analyses and considerations of this section are partly theoretical, in that they will demonstrate the gross meaning and significance of scatter, and partly practical, in that they will give a general guide to scatter analysis. These considerations will not go into great detail, and will provide only a general diagnostic orientation. This general orientation is what the examiner must keep in mind when he first looks at a scattergram, in order to approximate where among the clinical categories he is to place his patient. He must then go into the detailed analysis of the scatter of the single subtests, in order to find which of the possible categories is the likeliest.

The reader must here realize that the scatter measures represented by the graphs and the tables to follow are only rough measures of scatter. They were mechanically obtained by the algebraic addition of the positive and negative scatters, or by crude ratings within arbitrary limits. Thus, the hope to represent scatter adequately by such measures is small. If, even under these conditions, striking differences between groups in regard to their scatter can be established, it will be a minimum indicator, and in reality will be far exceeded by the differential diagnostic significance of scatter in the individual case.

1. Positive and Negative Vocabulary Scatter.

The most general of our results concerning Vocabulary Scatter are represented in Figure 2. Along the horizontal axis are plotted the names of our twenty-two clinical and control groups. Along the vertical axis the points represent the average negative and positive Verbal and Performance scatter of each group.

In order to make clear how these data were obtained, let us take the Psychotic Depressive group's average negative Performance Scatter, which is 26. This average was obtained by subtracting the Vocabulary score of each individual of this group from each of his five Performance scores; all of these differences which were negative were added up for the total group and this sum was divided by the number of cases in the group. Such an average therefore represents the extent of the drops of the Performance subtest scores below the Vocabulary level, where such are present. The averages for the 21 other groups, clinical and control, as well as the other three averages—positive Verbal, negative Verbal, and positive Performance—were obtained in the same manner.

The first conclusion to be drawn from the graph is that the positive Vocabulary Scatter is almost always much less than the negative; exceptions are the Simple Schizophrenia and the Maladjusted Patrol groups.[15] It is noteworthy that, in contrast to all our clinical groups, our Patrol groups yielded average positive and negative Vocabulary Scatters which cluster relatively close together; that is, subtest scores closer to the Vocabulary level, and more evenly distributed on both sides of it. *Here then is our first evidence that size and distribution of scatter can indicate pathology.*

The second conclusion to be drawn from the graph is that negative scatter on the Performance part is always higher than that on the Verbal part. In other words, the Verbal subtests are much more stable, and resistive to encroachment of maladjustment, than the Performance subtests. The only exception is the Deteriorated Paranoid Schizophrenic group, where the Verbal Scatter is two and a half points above the Performance Scatter. The deterioration here apparently has sufficient impoverishing effect on the Verbal subtests to make them match the Performance subtests. Though this group has only five cases, there is a rationale to the reversed relationship of negative Performance and Verbal Scatter in this group. As we shall see, in some Deteriorated Schizophrenias certain of the Performance subtests, such as Block Design and Object Assembly, keep up fairly well. Thus, though the smallness of the group would militate against the significance of this reversal, there is reason to assume that the reversal represents a true relationship.

---

[15] Inspection of the Simple Schizophrenia group's Vocabulary score will show that it is the lowest of all groups; accordingly, its Verbal Vocabulary Scatter is positive. The Patrol group in question is a group of only five cases, and as we shall see, it shows other anomalies also.

It will be noticed that the negative Performance Scatter—that is, the drop of Performance subtests below Vocabulary—is far greater in the two Depressive Psychosis groups than in the other groups. There is only one other group which approximates it, the Deteriorated Unclassified Schizophrenics. *This is our second, and more specific, evidence of the differential diagnostic usefulness of this scatter measure.*

The third conclusion to be drawn from this graph is that the positive Verbal Scatter tends to be, in general, greater than the positive Performance Scatter. This relationship is reversed in the Chronic, Deteriorated, and Simple Schizophrenias. The reason is that while maladjustment usually impairs Performance more than Verbal subtests, in these groups the extent of impairment is so general that impairment of the Verbal matches that of the Performance subtests. Among the Neuroses, the Hysterias and, to a mild degree, the clinically-related Mixed Neuroses have a greater positive Performance than positive Verbal Scatter. Though these differences are apparently small, they are significant because they are a reversal of the expectation, derived from findings on the rest of our groups, that Performance scores are more vulnerable to maladjustment than are Verbal scores.

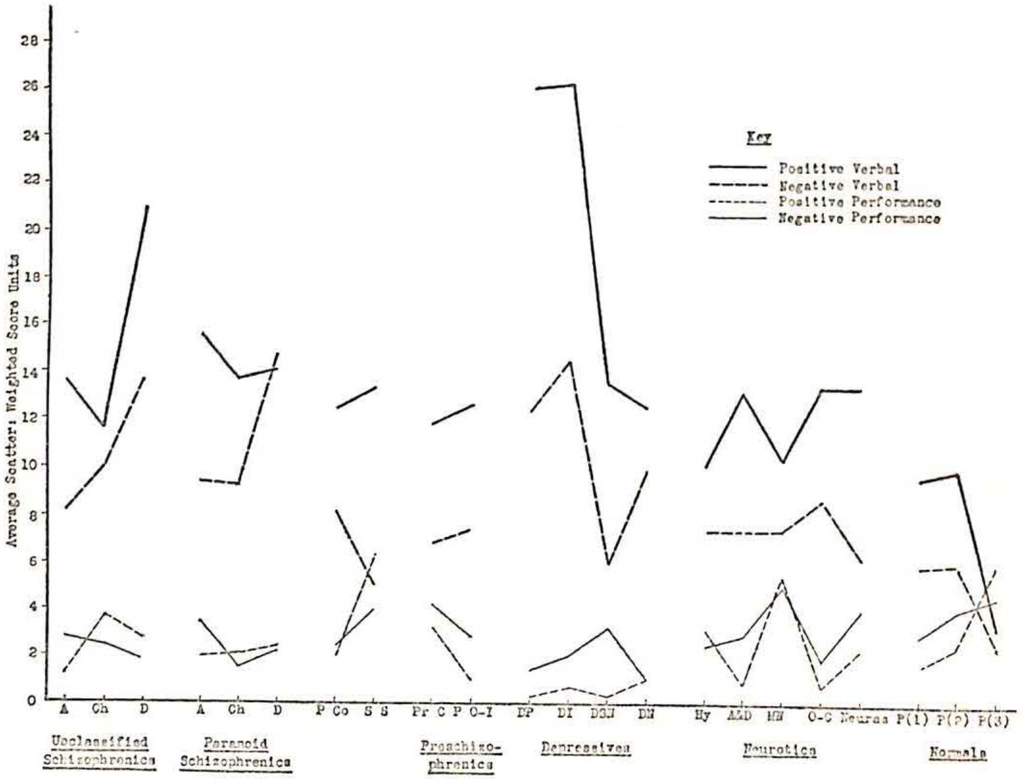


FIG. 2.—POSITIVE AND NEGATIVE VOCABULARY SCATTER OF THE VERBAL AND PERFORMANCE SUBTESTS
Group Averages

Furthermore, of all the Neurotic groups, these two have their negative Verbal and Performance Scatter closest together. This trend of the two groups has a rationale, derived from clinical understanding, in that the repression so characteristic of Hysteria encroaches upon the retention and efficient application of verbal knowledge.

The inferences drawn from Figure 2 are such that we did not consider it necessary to offer any kind of statistical evaluation of these data; partly because the examiner, when confronted with the individual scattergram of a case, will soon come to appreciate that these most outstanding differences are constantly present, and partly because the following statistical analyses give more or less direct proofs for the validity of the differences here discussed.

From the discussion of Figure 2 we conclude, *theoretically*, that it demonstrates the resistiveness of Vocabulary to impairment by maladjustment, since in most groups positive scatter is minimal and negative scatter is great; and *practically*, that extreme predominance of negative scatter is an indicator of psychosis, and that specific predominance of negative scatter on Performance subtests points to the presence of a Depressive Psychosis.

2. *Composite Vocabulary Scatter.*

Figure 3 represents Composite Vocabulary Scatter. The axes and the construction of the graph are the same as in Figure 2. However, since Composite Scatter is generally negative, in this and succeeding graphs negative scatter will be plotted above, and positive scatter will be plotted below, the horizontal axis. The graphlines represent Composite Performance Scatter (P), Composite Verbal Scatter (V), and Composite Verbal Scatter omitting Digit Span and Arithmetic from its calculation (V′).

Figure 3 shows that Performance Scatter is on the whole greater than Verbal Scatter, whether or not the easily impaired subtests, Digit Span and Arithmetic, are included in the latter. The justification for their omission is demonstrated by a comparison of graphlines V and V′ which shows that the V′ graphline is more clearly differentiating between groups. This is because, in both clinical and control groups, the scatter of Digit Span and Arithmetic is great, and tends to cloud the real significance of the rest of the Verbal Scatter.

Table 1-A presents the distribution of cases into ranges of Performance Scatter (P), and Table 1-C presents the distribution of cases into ranges of Verbal Scatter omitting Digit Span and Arithmetic (V′). The ranges correspond throughout to the usual measures applied by us in clinical practice to the evaluation of an individual scattergram. Inasmuch as each of these measures is the sum of the scatter of five subtests on the Performance part and of three subtests on the Verbal part, the limits of the ranges can be translated into the average drop of the scores by dividing the limits on the Performance part by 5 and on the Verbal part by 3. It will be seen, from the limits on the verbal part in Table 1-C, that we consider high positive scatter on the Verbal part to be any scatter equal to or more than +2, and high negative scatter to be any scatter equal to or less than −2.

Figure 3 shows that the outstanding scatter on the Performance part is found in the two Depressive Psychosis groups. The Schizophrenias appear to be sharply differentiated from them; they are not distinguished from the worse-performing Neurotics. The better-performing Neurotic groups (Hysteria and Mixed Neurosis) come within the range of the Patrol, which shows little scatter.[16]

Table 1-B gives the significance of the differences of distribution into ranges of Composite Performance Scatter of the major clinical and control groups. It indicates that the most significant drop of the Performance level below the Vocabulary level is in the Depressive Psychosis groups; next come the Severe Neurotic Depressions and the Deteriorated Schizophrenias; next, the non-deteriorated Paranoid Schizophrenias;[17] next, the non-deteriorated Unclassified Schizophrenias and, on the same level, the Neurotic Depressions; next, the Neurotic groups, and the subgroup of our Patrol cases showing depressive trends. The best of all our groups—that is, the group which has the least discrepancy between the Performance and Vocabulary levels—is the Patrol, excluding its depressive cases.

---

[16] The average Composite Performance Scatter of the Simple Schizophrenics is positive, but this does not indicate that they have a superior Performance ability; it is rather a consequence of their low Vocabulary level. See page 100.

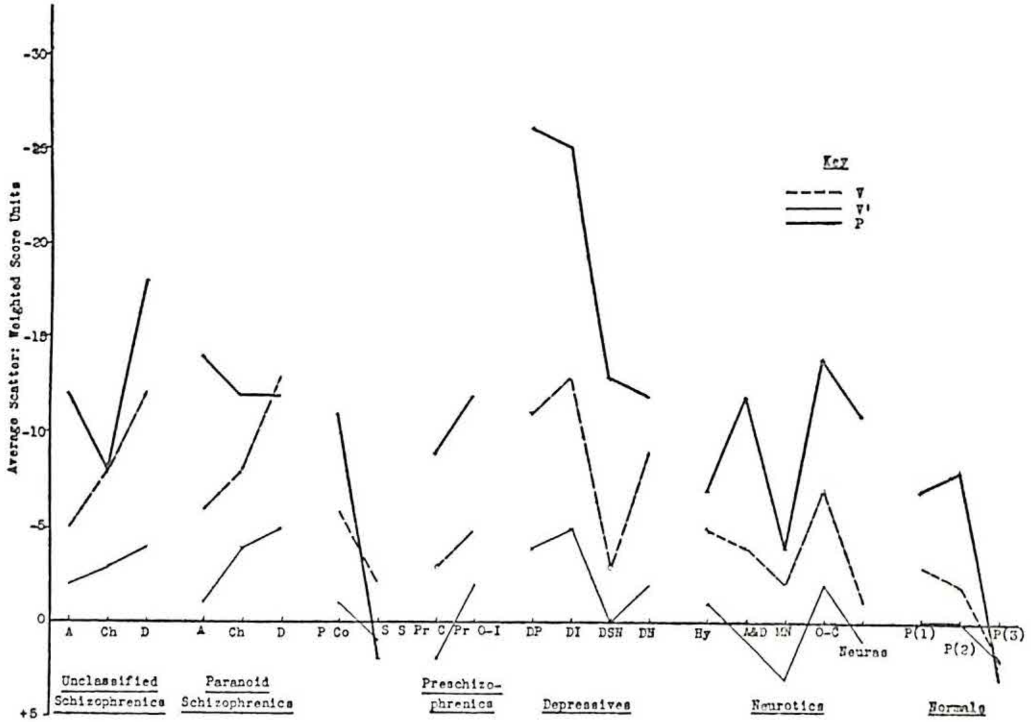


FIG. 3.—COMPOSITE VERBAL (V), MODIFIED VERBAL (V′), AND PERFORMANCE (P) VOCABULARY SCATTER
Group Averages

The sharp statistical differentiation of the Depressive Psychoses from all other clinical and control groups, excepting the Deteriorated Schizophrenias, is the outstanding result of this statistical analysis. It will be shown later that this great drop in the Depressive Psychoses is a consequence of depressive retardation; while in the Deteriorated Schizophrenias it is merely one segment of a tendency of some of the Performance scores to drop far below the Vocabulary level, for reasons other than retardation. Among the depressed clinical groups the extent of negative Composite Performance Scatter is more or less parallel to the severity of depression.

It is striking that, even within the normal range, Normals given to depressive mood swings show a tendency to have a greater drop of the Performance level than Normals

---

[17] This is the first of a series of results concerning the Paranoid Schizophrenias, running through all our analyses, to the effect that they do worse than other types of Schizophrenias on the Performance subtests. In fact, the pattern of their Performance scores appears to be much like that of the Depressions.

TABLE 1-A.—COMPOSITE P SCATTER. *Percentage of Cases in Ranges of Scatter*

Group	No. of Cases	Percentages			
		+44 to +20	+19 to +10	+9 to −4	−5 to −24
U Sch (A + Ch)	30	23	17	50	10
U Sch D	7	43	14	43	—
P Sch (A + Ch)	21	19	52	24	5
P Sch D	5	40	20	40	—
(P + U) Sch (A + Ch)	51	22	31	39	8
(P + U) Sch D	12	42	17	42	—
DP + DI	15	73	13	13	—
DSN	9	11	89	—	—
DN	7	29	14	57	—
Neurotics	59	17	38	36	10
Total Patrol	54	7	20	61	11
Patrol Depr	16	19	19	44	19
Patrol Non-Depr	38	3	21	68	8

TABLE 1-B.—*Differential Significance of Distributions of Cases*

Groups Compared	Chi^2(d.f. = 3)	Significance
U Sch (A + Ch) : U Sch D	1.61	50–70%
P Sch (A + Ch) : P Sch D	2.28	50–70%
(P + U) Sch (A + Ch) : (P + U) Sch D	3.36	30–50%
(DP + DI) : DSN	13.17	<<1%
(DP + DI) : DN	4.98	5–10%
DSN : DN	9.37	<1%
(DP + DI) : U Sch (A + Ch)	14.17	<1%
(DP + DI) : P Sch (A + Ch)	11.15	1%
(DP + DI) : (P + U) Sch D	3.25	20%
(DP + DI) : Neurotics	20.41	<<1%
(DP + DI) : Total Patrol	30.38	<<<1%
DSN : U Sch (A + Ch)	16.77	<1%
DSN : P Sch (A + Ch)	4.14	10–20%
DSN : Neurotics	8.51	2–5%
DSN : Total Patrol	20.05	<<1%
Neurotics : Total Patrol	9.93	2%
Neurotics : Patrol Non-Depr	11.10	<1%
Patrol Non-Depr : Patrol Depr	6.18	10%

TABLE 1-C.—COMPOSITE V′ SCATTER. *Percentage of Cases in Ranges of Scatter*

Groups	No. of Cases	Percentages		
		≧6	−5 to +5	≧ −6
(P + U) Sch (A + Ch)	51	24	73	4
(P + U) Sch D	12	58	25	17
DP + DI	15	33	67	—
DSN + DN	16	—	94	6
Neurotics	59	10	81	8
O-C	16	25	75	—
Neurotics − O-C	43	5	83	12
Patrol	54	6	87	7
Patrol Depr	16	6	81	12
Patrol Non-Depr	38	5	89	5

TABLE 1-D.—*Differential Significance of Distributions of Cases*

Groups Compared	Chi^2(d.f. = 2)	Significance
(P + U) Sch (A + Ch) : (P + U) Sch D	9.64	<1%
(P + U) Sch (A + Ch) : (DP + DI)	1.13	50–70%
(P + U) Sch (A + Ch) : (DSN + DN)	4.71	5–10%
(P + U) Sch (A + Ch) : (Neurotics − O-C)	7.80	2%
(P + U) Sch (A + Ch) : Patrol	7.12	2–5%
(P + U) Sch D : (DP + DI)	5.86	5–10%
(P + U) Sch D : (Neurotics − O-C)	20.84	<<<1%
(P + U) Sch D : Patrol	24.23	<<<1%
(DP + DI) : (DSN + DN)	7.12	2–5%
(DP + DI) : (Neurotics − O-C)	9.83	<1%
(DP + DI) : Patrol	9.89	<1%
(Neurotics − O-C) : O-C	6.96	2–5%
Patrol Depr : Patrol Non-Depr	.86	50–70%

without such mood swings. We could scarcely hope *a priori* that within the normal range we would find a difference in the intelligence test results which would be statistically demonstrable. Nevertheless it appears that our "depressive" Patrol differs from our "non-depressive" Patrol in the same direction that the clinical Depressions differ from the other clinical groups. This finding offers strong support for the contention that a lowered Performance level is generally a consequence of the presence of depressive trends.

From the discussion so far of Figure 3 and the related Tables, we conclude, *theoretically*, that a generalized lowering of the Performance scores below the Vocabulary score is most directly related to the presence of depressive trends; and *practically*, that we can estimate the severity of the depression by the extent of the negative Performance Scatter, and even infer the presence of depressive trends in Normals by the use of this scatter measure.

The V′ graphline of Figure 3 differentiates between the Patrol group and the Schizophrenic groups, in that in the Patrol it is entirely within the positive range, while in the main two Schizophrenic groups it is well within the negative range. It differentiates also between the Depressive Neuroses and the Depressive Psychoses, and between the Patrol and the Depressive Psychoses. The Neurotics, excepting the Hysterics and the Obsessive-Compulsives, resemble the Patrol; while the Obsessive-Compulsives have a great, and the Hysterics a small, negative V′ scatter. The verbal poverty of the Hysterics, and the tendency of the Obsessive-Compulsives to scatter somewhat like the Schizophrenics, here become apparent; this will be a recurrent finding in various parts of our analyses.[18]

Table 1-D gives the significance of the differences of distribution into ranges of Composite V′ Scatter of the major clinical and control groups; it indicates that the greatest drop of Verbal level below Vocabulary occurs in the Deteriorated Schizophrenias. These are sharply differentiated from the group closest to them in extent of impairment, the Acute and Chronic Schizophrenias, the Depressive Psychoses, and the Obsessive-Compulsive Neuroses. Less impaired are the Depressive Neuroses; these are followed by the Neurotics, excluding the Obsessive-Compulsives. Finally, the Patrol, as in the case of Composite P Scatter, has the least amount of scatter. The "depressive" Patrol is not distinguished from the "non-depressive" Patrol on V′ Scatter. It is demonstrated here that the Schizophrenias can be reliably differentiated from the Neuroses, excepting the Obsessive-Compulsives, by V′ Scatter, although they were not so differentiated by P Scatter. The Obsessive-Compulsive group here tends to go with the Schizophrenics. It is worthwhile to note that, while in extent of negative P Scatter the Depressive Psychoses exceeded the Deteriorated Schizophrenias, this relationship is reversed in regard to the Verbal scores.

We conclude, *theoretically*, that verbal functions are in general refractory to impairment by maladjustment, and that only schizophrenic deterioration, and to a lesser extent psychotic depression, are able in general to impair verbal functions; and *practically*, that a generalized lowering of the Verbal level below the Vocabulary level is a sign of psychosis, and its extreme is an indicator of a schizophrenic deterioration process.

3. *Differential* $(P-V')$ *and Total* $(P+V')$ *Scatter.*

Figure 4 represents Total and Differential Vocabulary Scatter, from the computation of which the scatter of Digit Span and Arithmetic were omitted. The Differential Vocabulary Scatter is the difference between P Scatter and V′ Scatter (P − V′).

---

[18] The Over-Ideational Preschizophrenics show up here like the Obsessive-Compulsives; the Simple Schizophrenics and Coarctated Preschizophrenics have a positive Composite V′ Scatter, due to their lowered Vocabulary level. See page 100.

In analyzing the P − V′ difference, our aim has been to follow up the finding that P differentiates the Depressives, and V′ the Schizophrenics, from other groups. The P − V′ difference should bring these patterns of the Depressives and Schizophrenics more sharply into relief, by showing that the Depressives, though having a lowered Verbal level, are especially impaired on Performance subtests; while the Schizophrenics have more a generalized, but approximately equal, P and V′ lowering. P − V′ would therefore tend to show a large difference in Depressives, and a much smaller difference in Schizophrenics.

The P − V′ graphline shows that the extreme Performance Scatter of the Depressive Psychotics surpasses their Verbal Scatter to such an extent that the Differential Scatter (P − V′) still remains extremely high, and far above that of all the other groups, clinical and control. Even the Depressive Neurotics show such a very high P − V′ scatter that they are differentiated from the Patrol.

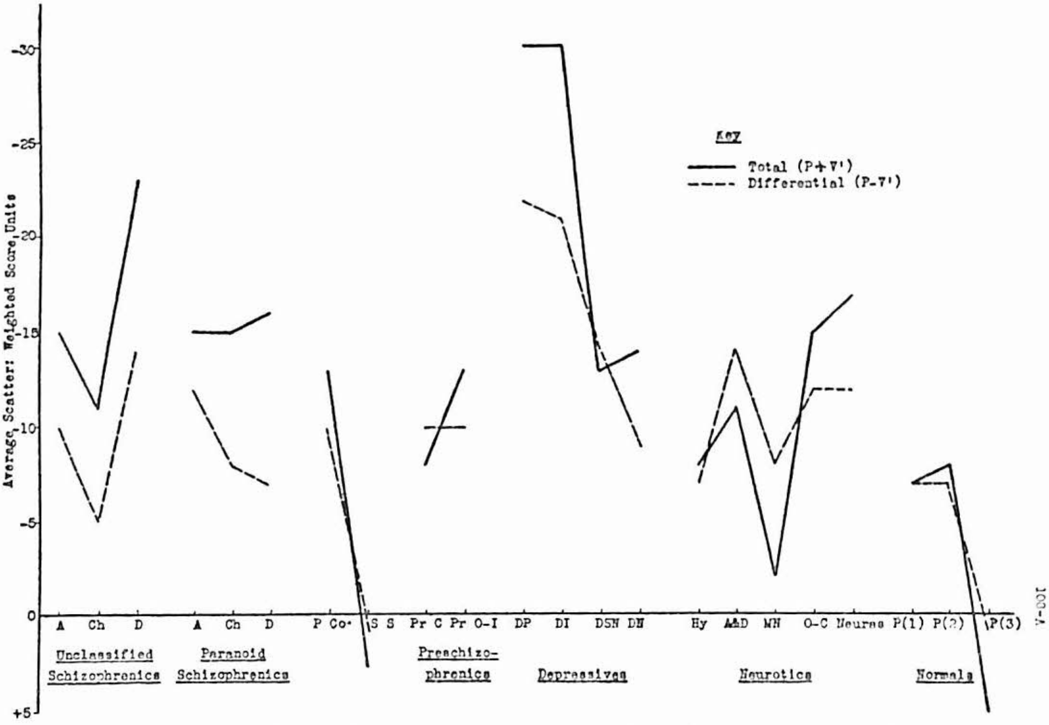


FIG. 4.—TOTAL (P+V′) AND DIFFERENTIAL (P−V′) VOCABULARY SCATTER Group Averages

The only other relationship brought to the fore by the P − V′ graphline pertains to the Anxiety and Depression group. This group shows on the Differential Scatter a rise to a considerable height, surpassing all the Neurotics and even the Depressive Neurosis groups. In the Performance Scatter this group's depressive characteristics were not clearly revealed, because its scatter was exceeded by that of the Obsessive-Compulsives; here, however, these depressive characteristics of the Anxiety and Depression group stand out, due to its excellently retained Verbal level which causes its P − V′ Scatter to exceed by far that of the Obsessive-Compulsives.

Tables 2-A and 2-B present the differential significance of the distribution of cases of all our groups into ranges of P − V′ Scatter; they show primarily that the Depres-

TABLE 2-A.—P − V′ SCATTER. *Percentage of Cases in Ranges of Scatter*

Groups	No. of Cases	Percentages		
		+39 to +20	+19 to +10	+9 to −19
U Sch	37	14	22	65
P Sch	26	15	46	38
DP + DI	15	67	13	20
DSN + DN	16	6	63	31
Neurotics	59	20	34	46
A & D	10	40	30	30
Neurotics − A & D	49	14	35	51
Patrol	54	6	20	74
Patrol Depr.	16	12	31	56
Patrol Non-Depr.	38	3	16	82

TABLE 2-B.—*Differential Significance of Distributions of Cases*

Groups Compared	Chi²(d.f. = 2)	Significance
U Sch : P Sch	4.75	5–10%
(DP + DI) : U Sch	15.14	<<1%
(DP + DI) : P Sch	11.45	<1%
(DP + DI) : (DSN + DN)	10.26	<1%
(DP + DI) : (Neurotics − A & D)	16.16	<<1%
(DP + DI) : A & D	1.84	30–50%
(DP + DI) : Patrol Non-Depr	27.78	<<<1%
(DP + DI) : Patrol Depr	9.62	<1%
(DSN + DN) : U Sch	6.61	2–5%
(DSN + DN) : P Sch	.39	80–90%
(DSN + DN) : (Neurotics − A & D)	2.46	30%
(DSN + DN) : Patrol Non-Depr	13.05	<<1%
(DSN + DN) : Patrol Depr	2.28	30–50%
(DSN + DN) : A & D	2.95	20–30%
(Neurotics − A & D) : A & D	5.19	5–10%
(Neurotics − A & D) : Patrol	6.05	2–5%
(Neurotics − A & D) : Patrol Non-Depr	9.07	1%
(Neurotics − A & D) : Patrol Depr	.12	90–95%
A & D : Patrol Non-Depr	15.05	<<1%
Patrol Non-Depr : Patrol Depr	4.18	10–20%

sive Psychosis groups have a P − V′ Scatter far in excess of all the other groups, their difference from the other groups being significant below the 1 per cent level. Next in extent of Differential Scatter comes the Anxiety and Depression group, then the Depressive Neuroses, then the Paranoid Schizophrenias, then the "depressive"

Patrol. These four groups are statistically not sharply differentiated from each other. The smallest Differential Scatter occurs in the Unclassified Schizophrenias, in the Neuroses (omitting the Anxiety and Depression group), and least of all in the "non-depressive" Patrol. Here again the Paranoid Schizophrenics share a characteristic with the Depressives. Although the Anxiety and Depression group is not statistically differentiable from the Depressive Psychoses or Neuroses by the use of Differential Scatter, it is easily differentiable in the individual case by excellent retention of Verbal scores, in contrast to the Depressive groups. It is this excellent Verbal retention which makes the moderate impairment of Performance appear extreme in the Differential Scatter.

TABLE 2-C.—P + V′ SCATTER. *Percentage of Cases in Ranges of Scatter*

Groups	No. of Cases	Percentages			
		+59 to +40	+39 to +30	+29 to +20	+19 to −29
P Sch + U Sch	63	9	9	13	69
DP + DI	15	33	20	27	20
DSN + DN	16	—	—	25	75
Neurotics	59	2	7	10	81
Patrol	54	—	4	6	91
Patrol, Depr	16	—	12	12	75
Patrol, Non-Depr	38	—	—	3	97

TABLE 2-D.—*Differential Significance of Distributions of Cases*

Groups Compared	Chi^2(d.f. = 3)	Significance
(P + U) Sch : (DP + DI)	12.44	<1%
(P + U) Sch : (DSN + DN)	4.43	20–30%
(P + U) Sch : Patrol	10.15	1–2%
(P + U) Sch : Patrol, Non-Depr	12.71	<1%
(DP + DI) : (DSN + DN)	13.35	<1%
(DP + DI) : Neurotics	26.31	<<<1%
(DP + DI) : Patrol	35.04	<<<1%
(DP + DI) : Patrol, Non-Depr	36.32	<<<1%
Neurotics : Patrol	2.09	50–70%
Neurotics : Patrol, Non-Depr	5.75	10–20%
Patrol, Non-Depr : Patrol, Depr	7.20	2–5%

From this P−V′ Scatter measure, which indicates the tendency for Performance subtest scores to drop further below the Vocabulary level than Verbal subtest scores, we conclude, *theoretically*, that Performance abilities are more easily impaired by depressive trends than Verbal abilities; and *practically*, that a large P−V′ Scatter indicates the presence of depressive trends, and the severity of these trends can as a rule be estimated by the extent of this Differential Scatter.

The Total Composite Scatter (P + V′) graphline in Figure 4 again demonstrates the tendency toward great scatter shown by the Depressive Psychoses; they exceed even the Schizophrenics, who are followed by the Depressive Neuroses and the Obsessive-Compulsives. Among the Schizophrenias, the Paranoid Schizophrenias as a whole tend to be most consistently bad, though the Deteriorated Unclassified Schizophrenias exceed in total impairment all other Schizophrenias. The differentiation between the Neurotics and the Patrol is fair. The greatest Total Scatter in the Neurotic group is found in the Obsessive-Compulsives; thus, while in the Performance Scatter they were equalled, and in the P − V′ Differential Scatter they were exceeded, by the Anxiety and Depression cases which follow the depressive pattern, on the whole they resemble the Schizophrenic pattern of great P *and* V′ impairments.

Tables 2-C and 2-D present the differential significance of the distribution into ranges of Total (P + V′) Scatter of our major clinical and control groups. They indicate that the greatest total drop from Vocabulary occurs in the Depressive Psychoses, which are sharply differentiated from the groups closest to them in extent of scatter, the Schizophrenias and Depressive Neuroses. The Neurotics run better, and the Patrol, excluding the "depressive" Patrol, runs best of all. However, the differences between the Schizophrenias, Depressive Neuroses, Neuroses, and Normals are only mild. It would appear therefore that this gross measure of Total Vocabulary Scatter is a relatively ineffective means of differentiating these groups. This is to be expected; impairment in either the Verbal or the Performance part can obscure the relative preservation of the other part when the two are added up in the P + V′ Scatter measure, and can thus make P + V′ appear the same as a mitigated and generalized lowering of both P and V′. Nevertheless, the usual sequence of extent of impairment in the clinical and control groups is still present. It is striking that even this crude a measure significantly differentiates the "depressive" and "non-depressive" Patrol.

This analysis of Total Vocabulary Scatter (P+V′) yields results consistent with those described previously, and lends support to the theoretical and practical conclusions there discussed.

4. Vocabulary Scatter: "t"-Test.

Table 3 presents the averages for each group on the four outstanding Vocabulary Scatter measures thus far discussed. These are the averages used in plotting the preceding graphs. This Table presents also the standard error of these means, and the significances tested by "Student's *t*" of the differences between these means and zero. The zero-level corresponds here to the Vocabulary level on which these scatter averages were based.

Two main conclusions may be drawn from this table: (a) The presence of so many significant deviations from zero, or the Vocabulary level, offers strong support for our contention that the Vocabulary level is relatively refractory to impairment, and that it may be used as a standard from which to estimate impairment of other functions. (b) The predominance

TABLE 3.—*Averages and Significances for Vocabulary Scatter Measures*

Group	No. of Cases	P Scatter				V' Scatter				P − V' Scatter				P + V' Scatter			
		M	σm	t	Sig.	M	σm	t	Sig.	M	σm	t	Sig.	M	σm	t	Sig.
U Sch A	17	12.4	2.91	4.26	<1%	2.1	1.16	1.81	5-10%	10.3	2.28	4.52	<1%	14.5	3.83	3.79	<1%
U Sch Ch	13	7.8	3.52	2.22	2-5%	2.6	1.15	2.26	2-5%	5.2	2.79	1.86	5-10%	10.5	4.43	2.37	2-5%
U Sch D	7	18.3	6.73	2.72	2-5%	4.4	2.89	1.52	10-20%	13.9	6.29	2.21	5-10%	22.7	8.16	2.78	2-5%
P Sch A	11	13.7	2.86	4.79	<1%	1.4	1.63	.86	40%	12.4	2.66	4.66	<1%	15.1	3.83	3.94	<1%
P Sch Ch	10	11.8	4.04	2.92	1-2%	3.6	1.57	2.29	5%	8.2	3.44	2.38	2-5%	15.4	5.07	3.04	1-2%
P Sch D	5	11.8	5.39	2.19	10%	4.6	2.93	1.57	20%	7.2	4.50	1.60	10-20%	16.4	7.41	2.21	5-10%
P Co	13	11.4	3.40	3.35	<1%	1.1	1.10	1.00	30%	10.3	3.45	2.99	1%	12.5	3.69	3.39	1%
S S	9	−1.9	2.92	.65	50-60%	−1.0	1.59	.63	50-60%	−.9	2.38	.38	70%	−2.9	4.06	.71	50%
Pr C	16	8.8	3.45	2.55	2%	−1.5	1.20	1.25	20-30%	10.2	2.73	3.74	<1%	7.3	4.29	1.71	10-20%
Pr OI	16	11.8	2.44	4.84	<1%	1.5	1.36	1.10	30%	10.2	1.92	5.31	<<1%	13.2	3.45	3.83	<1%
DP	8	25.6	4.29	5.97	<<1%	4.1	1.38	2.97	2%	21.5	4.36	4.93	<1%	29.8	4.66	6.39	<<1%
DI	7	25.4	4.21	6.03	<<1%	4.9	2.37	2.07	5-10%	20.6	2.93	7.03	<<1%	30.3	6.17	4.91	<1%
DSN	9	13.4	1.55	8.65	<<1%	−.1	4.31	.08	90-100%	13.6	1.60	8.50	<<1%	13.3	2.37	5.61	<<1%
DN	7	11.6	3.64	3.19	2%	2.3	.87	2.64	2-5%	9.3	3.93	2.37	6%	13.9	3.54	3.93	<1%
Hy	18	7.1	2.98	2.38	2-5%	.5	.98	.51	60%	6.6	2.49	2.65	1-2%	7.6	3.67	2.07	6%
A & D	10	12.4	2.63	4.71	<1%	−1.4	.86	1.63	10-20%	13.8	2.77	4.98	<1%	11.0	2.77	3.97	<1%
MN	9	4.3	4.11	1.05	30%	−2.8	1.46	1.92	5-10%	7.1	3.77	1.88	10%	1.6	4.83	.33	70-80%
O-C	16	13.5	2.80	4.82	<1%	1.8	.96	1.88	5-10%	11.7	2.32	5.04	<<1%	15.3	3.49	4.38	<1%
Neuras	6	11.2	5.13	2.18	5-10%	−.7	1.58	.44	70%	11.8	4.08	2.89	2-5%	10.5	7.07	1.49	10-20%
P (1)	32	6.8	1.15	5.91	<<1%	−.1	.71	.14	90%	6.9	1.22	5.66	<<1%	6.7	1.49	4.50	<<1%
P (2)	17	7.7	2.44	3.16	<1%	.3	1.11	.27	80%	7.4	2.16	3.43	<1%	8.0	3.11	2.57	2%
P (3)	5	−2.8	3.76	.74	50%	−2.0	1.10	1.82	10-20%	−.8	3.73	.21	80-90%	−4.8	4.09	1.17	30%

in the clinical and control groups of significant deviations of the Performance level from the Vocabulary level, and the absence of such deviations of the Verbal level, indicates that Verbal functions are more refractory to impairment than Performance functions.

We see thus far that the varied approaches to our material have yielded results either complementary or parallel. Only by approaching a body of raw data with *varied measures*, as we have attempted to do, can one hope to extract the full significance of such data. One measure never tells the whole story; it may by its intrinsic nature neglect important trends or give a one-sided picture. Cutting through the material from as many different angles as possible was the only way we saw to extract its full import.

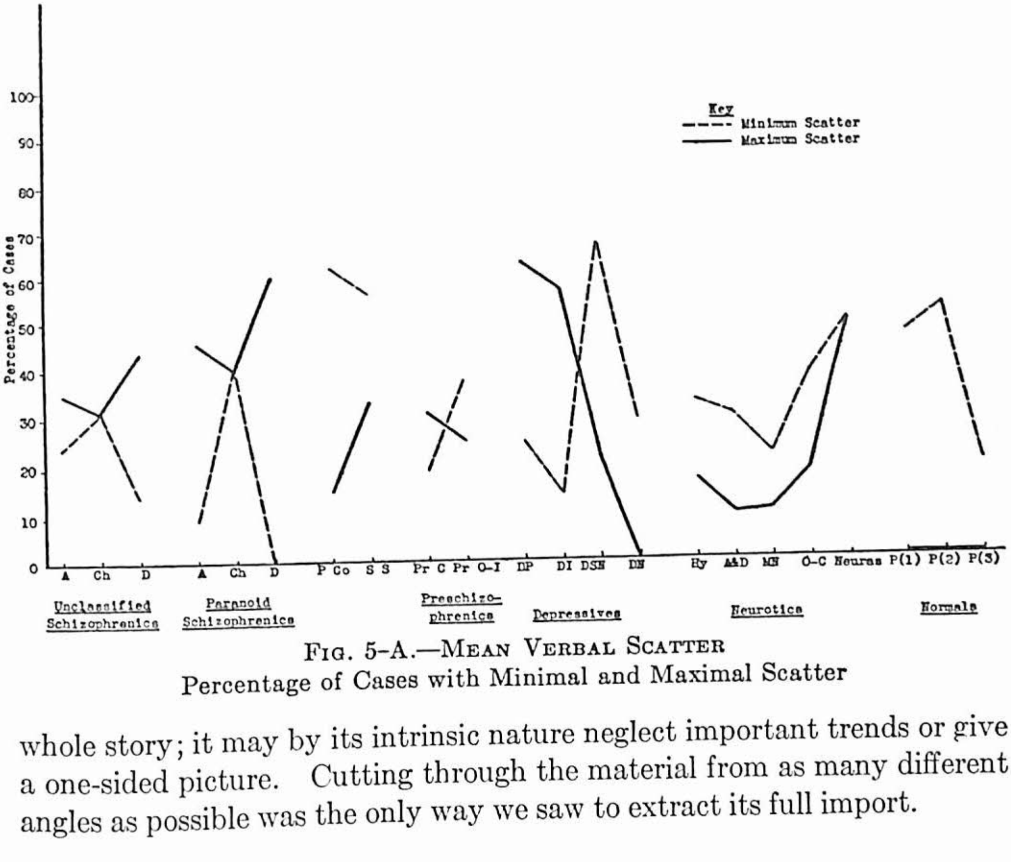


FIG. 5-A.—MEAN VERBAL SCATTER
Percentage of Cases with Minimal and Maximal Scatter

5. Mean Scatter.

Figures 5 represent Mean Scatter, that is to say the distribution of subtest scores around the Performance and Verbal Means respectively. Unlike the scatter measures obtained by subtracting the scatter base from the subtest score—as was done in the Vocabulary Scatter thus far used, or in the Modified Mean Scatter to be used later on—the scatter measure here used is a scatter-rating of individuals. This scatter rating was obtained in several steps:

(a) Based on experience, 5 ranges were set up around every subject's Performance Mean and Verbal Mean (omitting Digit Span and Arithmetic, and including Vocabulary). If every individual's mean is considered as the zero point and the difference of the mean and the score is X, the 5 ranges were: $X > +2$; $+2 \geqq X > +.5$; $+.5 \geqq X \geqq -.5$; $-.5 > X \geqq -2$; $-2 > X$.

(b) For every individual case the Mean Scatters of the subtests were distributed into these 5 ranges, separately for the Performance and Verbal subtests, e.g., 0 0 5 0 0, or 1 1 1 1 1, etc. Thus in the first example, all subtest scatters were in the middle range, and in the second example each range contained one subtest scatter.

(c) The distributions obtained by the procedure described under (a) and (b) were rated, separately for the Verbal and the Performance subtests, as: minimal (1), intermediate (2), extreme (3). The scatter rating (1) was allotted to cases for which the majority of subtest Mean Scatters were in the range $+.5 \geqq X \geqq -.5$. The scatter rating (3) was allotted to cases where the subtest Mean Scatters were distributed over all or most of the ranges, or heavily weighted in the extreme ranges. The scatter rating (2) was allotted to those distributions falling between these two extremes.

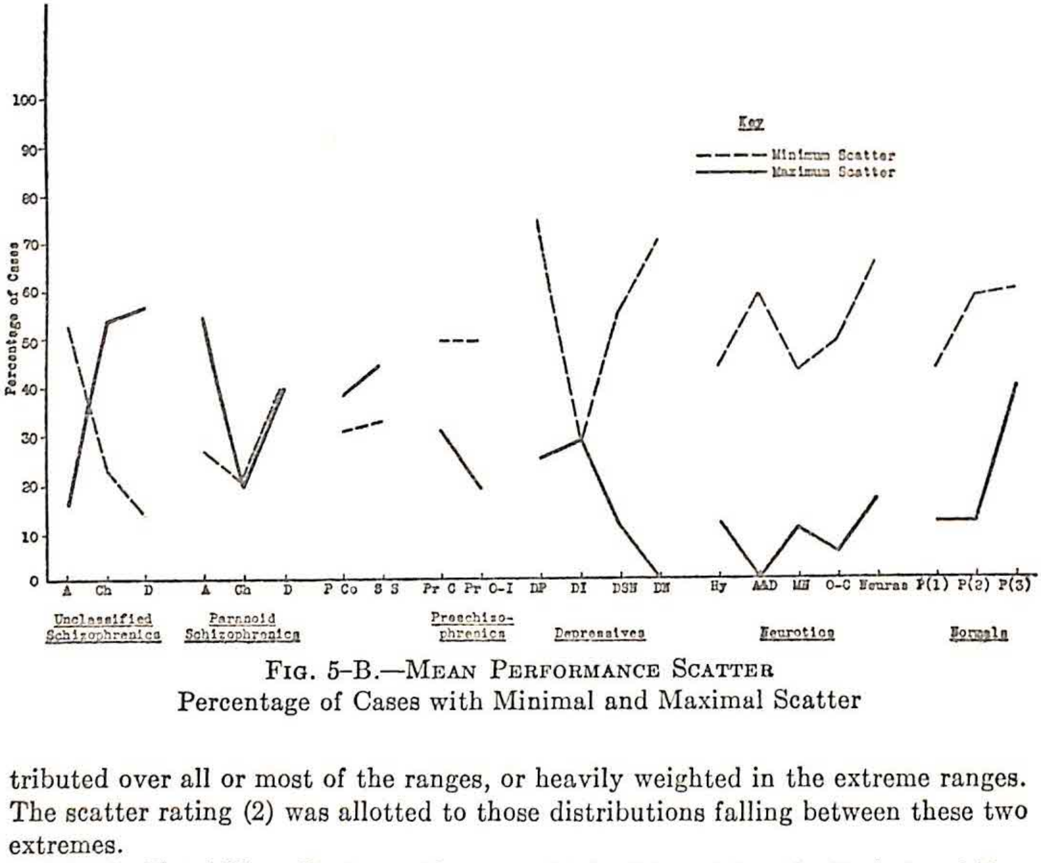


FIG. 5-B.—MEAN PERFORMANCE SCATTER
Percentage of Cases with Minimal and Maximal Scatter

(d) The Total Mean Scatter rating was obtained by adding the Verbal and Performance scatter ratings.

Thus we reached a crude scatter rating which distinguishes low scattering, intermediate scattering, and extremely scattering cases. The reader will see that, in spite of our efforts, a certain degree of arbitrariness could not be avoided in setting up such ranges and criteria for the three ratings of scatter. It should thus be clear that we aimed here not at obtaining diagnostic indicators but rather at demonstrating the general significance of Mean Scatter. These Scatter ratings, however, come much nearer to the verbatim sense of "scatter" than does Vocabulary Scatter; it shows the general tendency for the dispersal of scores which, for the experienced clinician, is the most ominous indication of maladjustment.

Figures 5-A, 5-B, 5-C represent, for all the clinical groups, and Figure 5-D for the combined major clinical groups, the percentage of cases with the minimal and maximal scatter ratings. The horizontal axis represents the sequence of clinical groups; the vertical axis represents the percentage of cases. The intermediate scatter-rating percentages were omitted to make the graph more easily surveyable for the essential points. In the statistical analysis of the distributions all the cases were, of course, taken into account. Before turning to Figures 5, let us remind ourselves first that the sequence of clinical and control groups, which we have followed in all our Figures, is a crude progression from the most severely maladjusted (at the left) to the "normal" cases (at the right). A survey of Figures 5-A, 5-B, 5-C, and 5-D shows that the graphline representing the percentage of cases with extreme scatter rating tends to drop as we progress from the most severely maladjusted (left) to the better adjusted groups (right); while the graphline representing the percentage of cases with minimal scatter ratings tends to rise over the same course. In other words, these graphs show that there is a tendency for the most maladjusted groups to have a great percentage of cases with extreme dispersal of subtest scores around the mean, and a low percentage of cases with close cluster of subtest scores around the mean; while in the better adjusted groups there is a great percentage of cases with close cluster of subtest scores around the mean, and a relatively low percentage of cases with extreme dispersal of subtest scores around the mean.

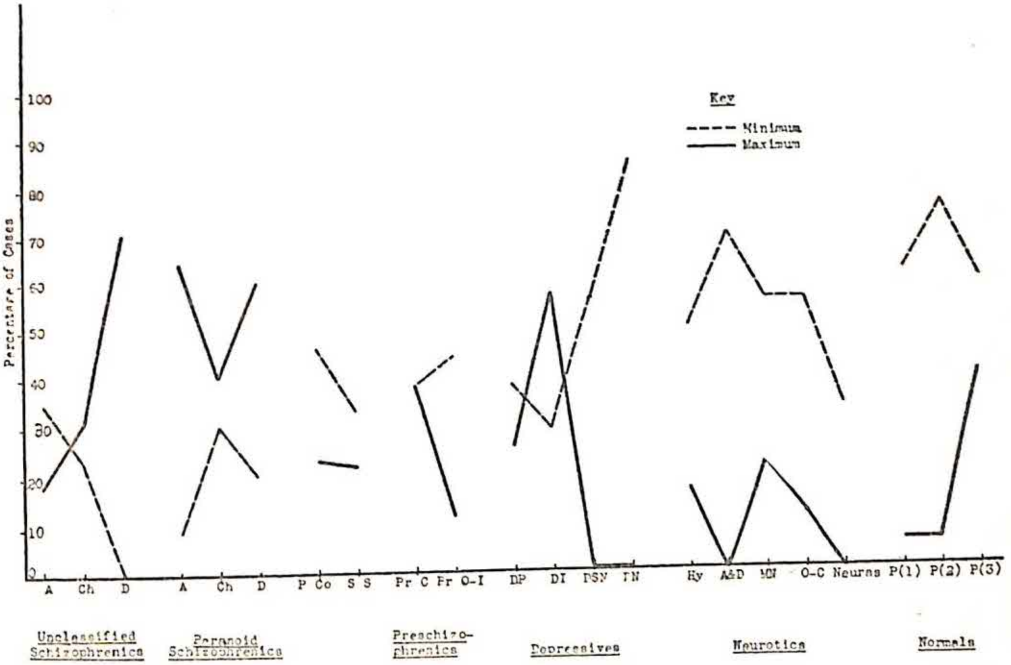


FIG. 5-C.—MEAN TOTAL SCATTER
Percentage of Cases with Minimal and Maximal Scatter

These relationships are brought into a simpler form—and thus into much sharper relief—in Figure 5-D, where only five combined major groups are represented. In all three graphs, the graphline representing the percentage of cases with scatter rating 3 runs much higher for the Schizophrenias and Depressive Psychoses than for the Depressive Neuroses, Neuroses, and Patrol; while the graphline representing the per cent of cases with scatter rating 1 runs lower for the Schizophrenia and Depressive Psychosis groups than for the other three groups. An exception is the behavior of the graphline representing scatter rating 1 in the Performance section. Here both the Depressive Psychosis and Depressive Neurosis groups run higher than the Neurotics and Patrol. The reason is that the Performance subtest scores of the Depressives are on the whole *uniformly* lowered, due to their psychomotor retardation, and thus cluster closely around their mean (though, as we have seen above, they show extreme Vocabulary Scatter). Though the Schizophrenics have fewer minimally scattering cases than any of the other groups, they have a somewhat higher percentage on Performance as compared with Verbal subtests. The reason for this cannot be discussed here, and will become clear only in the discussion of the individual Performance subtests.

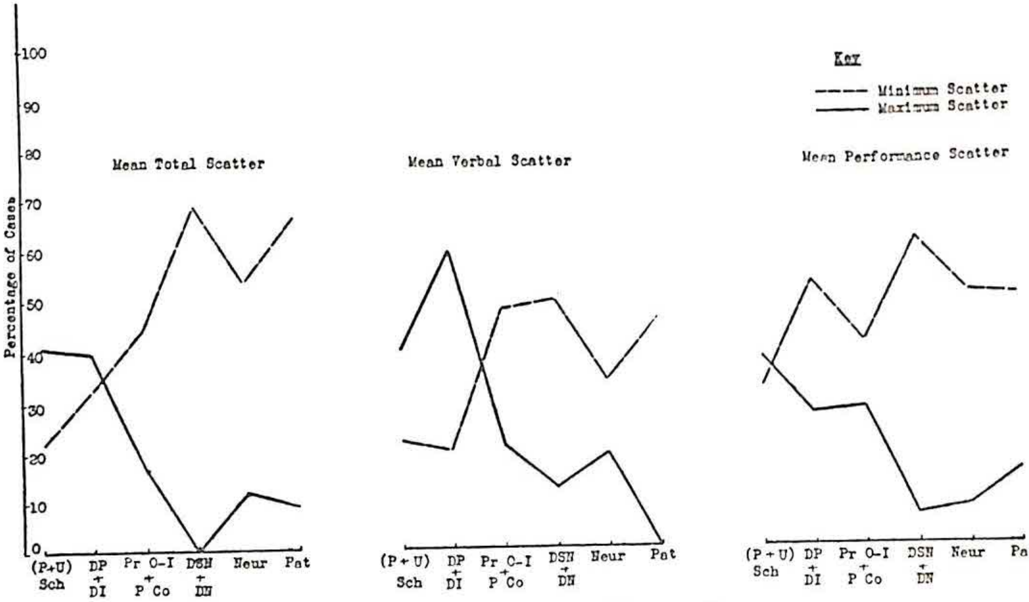


FIG. 5-D.—MEAN SCATTER: MAJOR GROUPS
Percentage of Cases with Minimal and Maximal Scatter

The most striking feature of these graphs is the absence of cases with extreme Verbal Scatter ratings in our Normal group. It is diagnostically impressive that, while in the Neuroses and the Patrol the scatter rating of 3 is likely to be found in only about 10% of the cases, in the Schizophrenic and the Depressive Psychosis groups it is likely to be found in 40% of the cases. Finally noteworthy is the behavior of the Preschizophrenic, Simple Schizophrenic, and Paranoid Condition groups which are represented only in Figures 5-A, 5-B and 5-C. In the Verbal Scatter rating, the Simple Schizophrenics and Paranoid Conditions distribute more as our Neurotics and Normals do; the Preschizophrenics tend more to follow a schizophrenic pattern. The reverse is the case for the Performance Scatter ratings, where the Simple Schizophrenics and Paranoid Conditions follow the schizophrenic pattern, and the Preschizophrenics come nearer to the neurotic pattern. For the distribution of the Total Scatter rating, the Preschizophrenics, Simple Schizophrenics, and Paranoid Conditions all fall somewhere between the neurotic and schizophrenic patterns, though nearer the latter.

TABLE 4-A.—SCATTER RATINGS BASED ON DISPERSAL FROM THE VERBAL AND PERFORMANCE MEANS. *Percentage of Cases in Ranges of Scatter* (1 = low scattering; 2 = intermediate; 3 = high scattering)

Group	No. of Cases	Verbal			Performance			Total		
		1	2	3	1	2	3	2 + 3	4	5 + 6
P Sch + U Sch..........	63	22	38	40	32	30	38	22	37	41
DP + DI................	15	20	20	60	53	20	27	33	27	40
DSN + DN..............	16	50	38	12	62	31	6	69	31	—
Neurotics................	59	34	47	19	51	41	8	54	34	12
Patrol....................	54	46	54	—	50	35	15	67	24	9
P Co + Pr OI...........	29	48	31	21	41	31	28	45	38	17

TABLE 4-B.—*Differential Significance of Distributions of Cases*

Groups Compared	Verbal		Performance		Total	
	Chi^2 (d.f. = 2	Significance	Chi^2 (d.f. = 2)	Significance	Chi^2 (d.f. = 2)	Significance
(P + U) Sch : (DP + DI)............	2.38	30%	2.42	30%	.92	50–70%
(P + U) Sch : (DSN + DN)..........	6.22	2–5%	7.27	2–5%	15.35	<<1%
(P + U) Sch : Neurotics..............	6.73	2–5%	14.83	<<1%	18.25	<<1%
(P + U) Sch : Patrol..................	27.89	<<<1%	8.45	1–2%	26.07	<<<1%
(P + U) Sch : (P Co + Pr OI)	6.91	2–5%	1.16	50–70%	6.92	2–5%
(P + U) Sch : SS......................	4.93	5–10%	.24	90%	1.30	50%
(P + U) Sch : Pr C....................	.75	70%	1.98	30–50%	1.67	30–50%
(DP + DI) : (DSN + DN)...........	7.79	2%	2.57	20–30%	8.32	1–2%
(DP + DI) : Neurotics................	10.31	<1%	4.80	5–10%	6.80	2–5%
(DP + DI) : Patrol.....................	36.45	<<<1%	1.86	30–50%	9.12	1%
Patrol : Neurotics......................	11.55	<1%	1.21	50–70%	1.86	30–50%
Patrol : (P Co + Pr OI)..............	12.34	<1%	1.98	30–50%	3.73	10–20%

Tables 4 bear out the indications of these Figures. The Schizophrenics and Depressive Psychotics are the most scattered groups, and are sharply differentiated from the Depressive Neurotics, Neurotics, and Normals in regard to Total Scatter and Verbal Scatter. The Performance scores again appear to be relatively more vulnerable to maladjustment, and the differentiation between groups is less clear. Even here, however, the Schizophrenics are differentiated from the Depressive Neurotics, Neurotics, and Normals in extent of scatter. The Depressive Psychotics are not clearly differentiated from these groups; this indicates that although the

Depressive Psychotics tend to have great impairment of Performance functions,[19] these impairments are relatively uniform and show little dispersal. This is the type of finding which indicates the necessity of several kinds of scatter measures, some showing us the deficiencies of certain groups in terms of great tendency to dispersal of the subtests, others showing us the tendency of great uniform drops of certain scores or score groups in different clinical categories. Table 4 also indicates that extreme Verbal Scatter is absent in our Normal group, making it possible to differentiate some Neurotics from Normals on the basis of Mean Verbal Scatter.

From the study of Mean Scatter in terms of scatter ratings, we conclude, *theoretically*, that disparity of efficiency of functions underlying subtest achievements in an intelligence test is an expression of maladjustment, and that the degree of disparity—that is, the dispersal from each other and from their central tendency of these achievements and the functions underlying them—roughly parallels the degree of maladjustment; and *practically*, that great dispersal on the total test and/or on the Verbal part is diagnostic for Schizophrenia or Depressive Psychosis, while great dispersal on the Verbal part with little on a generally-lowered Performance part is specifically diagnostic of Depressive Psychosis. In the Normals no extreme dispersal on the Verbal part is to be expected.

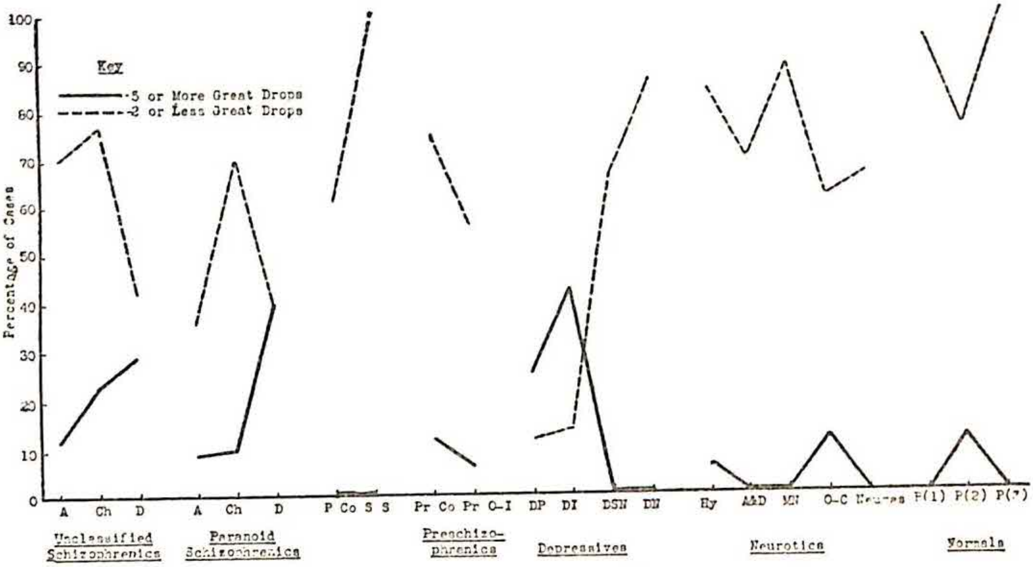


FIG. 6.—GREAT SCATTER BELOW THE VOCABULARY LEVEL
Percentage of Cases with Few and Many Great Drops

6. Great Negative Vocabulary Scatter. One of the most striking features of the individual Scattergram is the extremely low weighted scores found on a few subtests when, at the same time, the other subtests, and especially Vocabulary, have high weighted scores. These low scores are conspicuous, and contribute a great part to both the Vocabulary and Mean Scatter.

---

[19] See Vocabulary Scatter, page 57.

Here we shall treat the very low weighted scores as "great negative Vocabulary Scatters". Single scatter of this kind may be present in normal as well as clinical cases, and our aim is to establish their pathognomonic weight.

Figure 6 represents the percentage in each group of those cases which have 2 or fewer great negative Vocabulary Scatters,[20] and of those cases which have more than 5 great negative Vocabulary Scatters. Here again Digit Span and Arithmetic were omitted. The graph shows that Depressive Psychotics and Deteriorated Schizophrenics have the highest percentage of cases with such great negative scatter; they are followed by the rest of the Schizophrenics, while other groups only sporadically have cases of this sort. Among the Patrol, the only such cases were in the "depressive" subgroup.

In those groups where the percentage of cases having more than 5 great scatters is high, the percentage of cases having 3–5 such scatters is high too; and the percentage of cases with 0–2 such scatters is low. The least number of cases with 0–2 such scatters is found in the Depressive Psychoses, next in the Deteriorated Schizophrenias, next in the other Schizophrenias[21] and obsessive-like Neuroses, next in the Depressive Neuroses and hysteric-like Neuroses, and least of all in the Patrol. Tables 5-A and 5-B present the significance of the distributions of the cases in every group having no such extreme drops (0–2), considerable (3–5), and a great number (>5). Tables 6-A and 6-B present the statistical significance of the frequency of extreme scatters in terms of their percentage weight in the total number of subtest scores of each group.

From Figure 6 and Tables 5-A–B and 6-A–B, we conclude, *theoretically*, that single extreme inadequacy of a function underlying a subtest performance may occur—possibly as a developmental anomaly, or as an expression of limited background—in the normal population, but that in general an extreme disparity in efficiency is an indicator of pathology; and *practically* that more than two extreme drops of subtest scores below the Vocabulary level is an indicator of pathology, and more than five such drops are most likely indicative of the presence of a Depressive Psychosis or Schizophrenia.

TABLE 5.—GREAT NEGATIVE VOCABULARY SCATTER*

(Subtest Scores Much Below Vocabulary)

Limits

Comprehension	$\leqq -3$	Picture Completion	$\leqq -4$
Information	$\leqq -3$	Object Assembly	$\leqq -5$
Similarities	$\leqq -3$	Block Design	$\leqq -3$
Picture Arrangement	$\leqq -4$	Digit Symbol	$\leqq -4$

* Digit Span and Arithmetic were excluded from consideration here.

7. General Diagnostic Conclusions. Figure 7 presents a summary of the scatter measures found to be most effective in establishing a differential diagnosis between our major groups.

The figure is offered as a most general guide to the characteristic scatter

---

[20] See the limits for "great negative scatter" on Table 5.

[21] The Simple Schizophrenics are again an exception, having a low Vocabulary level and no great drops at all.

TABLE 5-A.—*Percentage of Cases Having 2 or Less, 3–5, and More than 5 Scores of Great Negative Vocabulary Scatter*

Group	No. of Cases	% of Cases		
		≦2	3–5	>5
U Sch A	17	70	18	12
U Sch Ch	13	77	—	23
U Sch D	7	42	29	29
P Sch A	11	36	55	9
P Sch Ch	10	70	20	10
P Sch D	5	40	20	40
P Co	13	61	39	—
S S	9	100	—	—
Pr C	16	75	12	12
Pr OI	16	56	38	6
DP	8	12	62	25
DI	7	14	43	43
DSN	9	67	33	—
DN	7	86	14	—
Hy	18	84	10	6
A & D	10	70	30	—
MN	9	89	11	—
O-C	16	62	25	12
Neuras	6	67	33	—
Patrol (1)	32	94	6	—
Patrol (2)	17	76	12	12
Patrol (3)	5	100	—	—
Special Groups:				
(P + U) Sch (A + Ch)	51	65	22	14
(P + U) Sch D	12	42	25	33
(P + U) Sch	63	60	22	17
DP + DI	15	13	53	33
DSN + DN	16	75	25	—
Neurotics	59	75	20	5
Neurotics − O-C	43	79	19	2
Patrol Depr	16	81	6	12
Patrol Non-Depr	38	92	8	—

patterns of various clinical and normal groups. It represents the most important information arising out of the application of two different scatter measures; scatter from the Vocabulary level, which is presumed to measure the extent of impairment from the original intelligence level; and scatter from the Verbal and Performance Means, which is presumed to measure the disharmony of efficiency of the functions involved in the various subtests of the Bellevue Scale. These scatter measures, however, instruct us only in the most general group trends, and offer no information of the characteristic behavior of one group or another on the individual subtests.

TABLE 5-B.—*Differential Significance of Distributions*

Groups Compared	Chi^2 (d.f. = 2)	Significance
(P + U) Sch (A + Ch) : (P + U) Sch D	3.00	20–30%
(P + U) Sch (A + Ch) : (DP + DI)	12.47	<<1%
(P + U) Sch (A + Ch) : Neurotics	2.72	20–30%
(P + U) Sch (A + Ch) : Patrol	8.61	1–2%
(P + U) Sch D : (DP + DI)	3.42	10–20%
(P + U) Sch D : Neurotics	9.58	<1%
(P + U) Sch D : Patrol	14.79	<<1%
(DP + DI) : (DSN + DN)	13.62	<<1%
(DP + DI) : Neurotics	20.88	<<<1%
(DP + DI) : Patrol	34.02	<<<1%
(DSN + DN) : P (1)	1.92	10–20%
(DSN + DN) : Patrol Non-Depr	1.60	20%
(Neurotics − O-C) : O-C	3.07	20–30%
Neurotics : Patrol	4.07	10–20%
Neurotics : P (1)	5.33	5–10%
Neurotics : Patrol Non-Depr	5.24	5–10%
P (1) : P (2)	4.48	10–20%
Patrol Depr : Patrol Non-Depr	4.85	5–10%

(a) The most characteristic features of the scatter of the Schizophrenic group are the tendency for an impairment of verbal functions (great V' Scatter), and a tendency for the Verbal and Performance subtest scores to scatter widely from their respective means. These two tendencies differentiate the Schizophrenics from the Depressive Neurotics, the Neurotics, and the Patrol.

(b) The Depressive Psychotics most characteristically have an extreme impairment of efficiency on the Performance subtests; and although their Verbal scores are also lowered, the discrepancy between their Performance level and their Verbal level remains extreme. This characteristic scatter

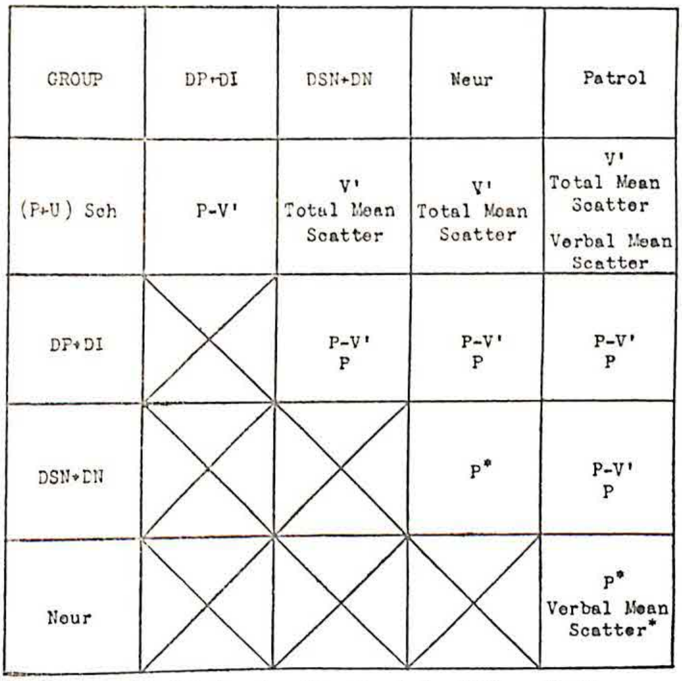
TABLE 6-A.—*Percentage of All Subtests with Great Vocabulary Scatter (Limits as in Table 5)*

Group	Total Subtests	% With Great Scatter
U Sch A	136	22
U Sch Ch	104	28
U Sch D	56	39
P Sch A	88	36
P Sch Ch	80	31
P Sch D	40	40
P Co	104	25
S S	72	6
Pr C	128	22
Pr OI	128	28
DP	64	55
DI	56	64
DSN	72	26
DN	56	23
Hy	144	18
A & D	80	24
MN	72	15
O-C	128	27
Neuras	48	25
P (1)	256	12
P (2)	136	21
P (3)	40	2
Special Groups:		
U Sch (A + Ch)	240	25
P Sch (A + Ch)	168	34
(U + P) Sch D	96	40
DP + DI	120	59
DSN + DN	128	25
Neurotics	472	22
Patrol	432	14

pattern (great P and P − V′ Scatter) distinguishes, in general, the Depressive Psychotics from the Schizophrenics, the Depressive Neurotics, the Neurotics, and the Patrol.

TABLE 6-B.—*Differential Significance of Percentages*

Groups Compared	Chi^2 (d.f. = 1)	Significance
U Sch (A + Ch) : P Sch (A + Ch)	4.24	2–5%
U Sch (A + Ch) : (P + U) Sch D	7.51	<1%
P Sch (A + Ch) : (P + U) Sch D	.85	30–50%
(DP + DI) : U Sch (A + Ch)	41.47	<<<1%
(DP + DI) : P Sch (A + Ch)	18.06	<<<1%
(DP + DI) : (P + U) Sch D	8.18	<1%
(DP + DI) : (DSN + DN)	29.77	<<<1%
(DP + DI) : Neurotics	64.29	<<<1%
(DP + DI) : Patrol	103.13	<<<1%
(DSN + DN) : Patrol	8.02	<1%
Neurotics : P (1)	9.55	<1%



GROUP	DP+DI	DSN+DN	Neur	Patrol
(P+U) Sch	P-V'	V' Total Mean Scatter	V' Total Mean Scatter	V' Total Mean Scatter Verbal Mean Scatter
DP+DI		P-V' P	P-V' P	P-V' P
DSN+DN			P*	P-V' P
Neur				P* Verbal Mean Scatter*

* Significant but not extremely sharp differentiation by this measure.

FIG. 7.—SCATTER MEASURES BEST DIFFERENTIATING THE MAJOR CLINICAL AND CONTROL GROUPS

(c) Most characteristic feature of the Depressive Neurotics is a somewhat impaired efficiency of function on the Performance subtests, while their Verbal efficiency remains well-retained. This scatter pattern distinguishes the Depressive Neurotics to a certain extent from the Neurotics, and to a much greater extent from the Patrol.

(d) Most characteristic of the Neurotic groups is the mild tendency to have an impaired Performance efficiency and increased Verbal Scatter. To a certain extent, these tendencies differentiate the Neurotics from the Patrol.

In presenting these major patterns and their crude diagnostic significance in summary form, we have neglected their differentiating value, shown in the preceding tables and discussion, for the subdivisions of major groups. Our aim here was merely to present and validate major scatter patterns. It remains then to fill in this gross framework of scatter patterns with a more detailed analysis of characteristic scatter on each subtest, to the end of making possible more sensitive analyses of scatter patterns for individual diagnoses. Such analysis will be presented in the following sections.

D. INTRODUCTION TO THE ANALYSIS OF THE BELLEVUE SUBTESTS

In this section the reader will find several tables and figures representing some of the results of our analysis of the individual subtests of the Bellevue Scale. These tables and figures present simultaneously results that pertain to *all* the subtests. Thus, Special Table 1 presents the average Vocabulary Scatter and its significance for all our groups on each of the 11 subtests.

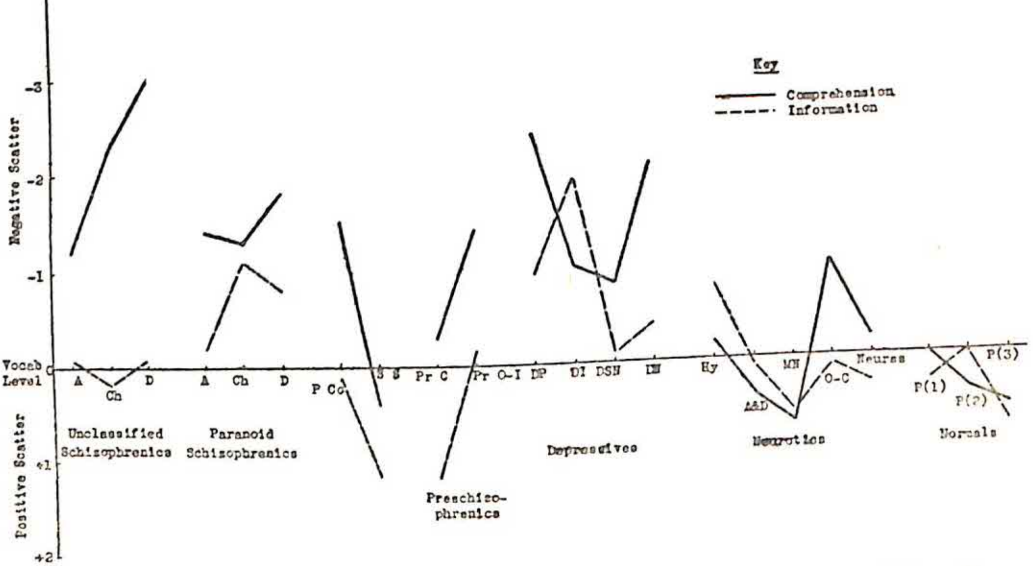
We felt it was advisable to do this to facilitate comparison of achievement on different subtests by the same group or groups, and comparison of certain aspects of the variability of the individual subtests. A breakdown of these tables and figures, presenting the results on each subtest in the appropriate following sub-section, would have made the results less meaningful to the reader, as he would not have immediately available results on other subtests for comparison. In the following sub-sections, each dealing with the analysis of one of the 11 subtests of the Bellevue Scale, we shall frequently refer back to these Special Tables and Special Figures.

Special Table 1: This table presents for each group its average Vocabulary Scatter on each of the 11 subtests, and the significance of these averages. Thus, for example, the Acute Unclassified Schizophrenics have an average Vocabulary Scatter on Comprehension of -1.2; the significance of the difference between this average and zero (the Vocabulary level) is on a 1% to 2% level. In this table we did not enter the *t*-score, nor the significance of any average that was significant only above the 20% level. Gaps thus do not mean that the *t*-score and significances were not calculated, but rather that they were above the limit here set. It is hoped that these omissions will bring more clearly to the attention of the reader the main trends toward significance. A positive mean implies that the average achievement of the group on the subtests was better than their average achievement on Vocabulary.

SPECIAL TABLE 1.—*Average Vocabulary Scatter on Each Subtest and the Significance of the Difference from Zero (t-test)*

Group	N	Comprehension			Information			Similarities			Digit Span			Arithmetic			Picture Arrangement			Picture Completion			Object Assembly			Block Design			Digit Symbol		
		M	σ_M	Signif.	M	σ_M	Signif.	M	σ_M	Signif.	M	σ_M	Signif.	M	σ_M	Signif.	M	σ_M	Signif.	M	σ_M	Signif.	M	σ_M	Signif.	M	σ_M	Signif.	M	σ_M	Signif.
U Sch A	17	−1.2	.46	1- 2%	−.1	.57		−.8	.65		−.8	1.00		−2.6	.48	<1%	−2.8	.72	<1%	−2.9	.80	<1%	−3.1	.80	<1%	−1.5	.71	5%	−2.2	.73	<1%
U Sch Ch	13	−2.3	.64	<1%	+.2	.48		−.3	.46		−2.8	1.07	2- 5%	−2.4	.88	1- 2%	−1.4	.77	5-10%	−2.1	.86	2- 5%	−2.0	1.36	10-20%	−.5	.96		−1.8	1.14	10-20%
U Sch D	7	−3.0	1.27	5-10%	−.1	.70		−1.3	1.34		−2.7	1.25	5-10%	−4.7	1.46	1- 2%	−7.0	1.57	<1%	−5.6	1.77	1- 2%	+.4	1.34		−1.3	1.17		−4.9	1.64	2- 5%
P Sch A	11	−1.4	.86	10-20%	−.2	.38		+.2	.99		−3.4	.99	<1%	−1.5	.81	5-10%	−3.2	.66	<1%	−3.1	1.10	1- 2%	−3.1	.93	<1%	−1.2	1.03		−3.2	1.02	1%
P Sch Ch	10	−1.3	.83	10-20%	−1.1	.66	10-20%	−1.2	.50	2- 5%	−2.0	.80	2- 5%	−2.1	1.03	5-10%	−2.8	1.06	2- 5%	−3.1	.98	1- 2%	−2.1	1.14	10%	−1.4	1.22		−2.4	.86	2- 5%
P Sch D	5	−1.8	.97	10-20%	−.8	1.28		−2.0	1.67		−4.0	2.14	10-20%	−4.0	2.02	10-20%	−4.8	.73	<1%	−1.8	.82	5-10%	−1.4	1.60		−1.2	1.93		−2.6	1.72	20%
P Co	13	−1.5	.45	<1%	+.1	.33		+.3	.65		−2.5	1.17	5%	−2.8	.73	<1%	−3.1	.75	<1%	−3.0	.75	<1%	−2.3	.96	2- 5%	−1.8	1.07	10-20%	−1.2	.93	
S S	9	+.4	.60		+1.2	.46	2- 5%	−.7	.93		−1.3	.73	10-20%	−1.3	1.20		−.3	.85		−.8	.83		+1.8	.92	5-10%	+.9	.75		+.3	1.01	
Pr C	16	−.3	.74		+1.2	.37	<1%	+.6	.42	10-20%	−2.4	.95	2%	−1.8	.65	1- 2%	−2.5	.87	1- 2%	−2.5	.81	<1%	−1.6	.75	5%	−.7	.75		−1.4	.89	10-20%
Pr O-I	16	−1.4	.53	1- 2%	−.2	.49		+.2	.57		−2.4	.67	<1%	−1.1	.59	5-10%	−3.2	.82	<1%	−2.4	.58	<1%	−2.8	.67	<1%	−1.1	.54	5-10%	−2.2	.59	<1%
DP	8	−2.4	.92	2- 5%	−.9	.74		−1.0	1.02		−4.0	1.58	2- 5%	−2.6	.73	<1%	−3.9	1.13	1%	−6.1	.59	≪1%	−5.5	1.18	≪1%	−5.4	.82	≪1%	−4.8	1.60	2%
DI	7	−1.0	.98		−1.9	.77	2- 5%	−2.0	1.65		−4.1	1.53	2- 5%	−3.6	1.21	2- 5%	−5.7	.89	≪1%	−5.1	.63	≪1%	−3.4	1.70	5-10%	−5.0	1.15	≪1%	−6.1	1.12	≪1%
DSN	9	−.8	.57	20%	−.1	.54		+1.0	.75		−2.4	.85	2- 5%	−.4	.88		−2.7	.96	2- 5%	−2.1	.39	≪1%	−2.8	.81	<1%	−2.7	.50	≪1%	−3.2	.60	≪1%
DN	7	−2.1	.59	1- 2%	−.4	.48		+.3	.47		−2.9	1.32	5-10%	−3.9	.88	≪1%	−2.3	.97	5-10%	−2.3	.68	1- 2%	−3.1	1.59	5-10%	−1.7	.86	5-10%	−2.1	.53	<1%
Hy	18	−.2	.51		−.8	.40	10-20%	+.3	.41		−3.1	.70	≪1%	−1.2	.55	2- 5%	−.7	.72		−2.4	.61	≪1%	−2.3	.74	<1%	−.8	.71		−.9	.85	
A & D	10	+.4	.60		+.1	.31		+.9	.57	10-20%	−3.7	.65	≪1%	−2.0	.98	5-10%	−1.5	.69	5-10%	−2.8	.68	≪1%	−3.6	.95	<1%	−2.3	.76	1- 2%	−2.2	.74	1- 2%
MN	9	+.7	.82		+.6	.47		+1.6	.63	2- 5%	−2.6	.75	<1%	−2.2	.97	5%	−1.9	.92	5-10%	−1.3	.88	10-20%	−1.1	1.39		−.1	1.10		+.1	1.06	
O-C	16	−1.0	.52	5-10%	+.1	.38		−.8	.51	10-20%	−3.2	.88	<1%	−2.4	.51	≪1%	−3.2	.72	≪1%	−3.3	.62	≪1%	−2.3	.83	1- 2%	−2.0	.63	<1%	−2.6	.71	<1%
Neuras	6	−.2	1.28		+.3	.61		+.5	.96		−2.0	.63	2- 5%	+.2	.98		−3.3	1.36	5-10%	−1.8	.98	10-20%	−3.5	1.23	2- 5%	−1.7	1.56		−.8	.91	
P (1)	32	0	.34		+.3	.30		−.2	.28		−2.0	.53	≪1%	−1.2	.44	<1%	−2.0	.40	≪1%	−.9	.32	<1%	−1.6	.53	<1%	−.8	.34	1- 2%	−1.4	.44	<1%
P (2)	17	+.4	.59		0	.27		−.6	.41	10-20%	−.9	.86		−.9	.88		−2.2	.79	1- 2%	−1.5	.62	2- 5%	−2.4	.79	<1%	−1.1	.58	5-10%	−.5	.61	
P (3)	5	+.6	.68		+.8	.58		+.6	.98		0	1.99		+.2	.37		+.2	.58		+.8	.80		−1.0	1.73		+1.8	.73	5-10%	+1.0	1.10	

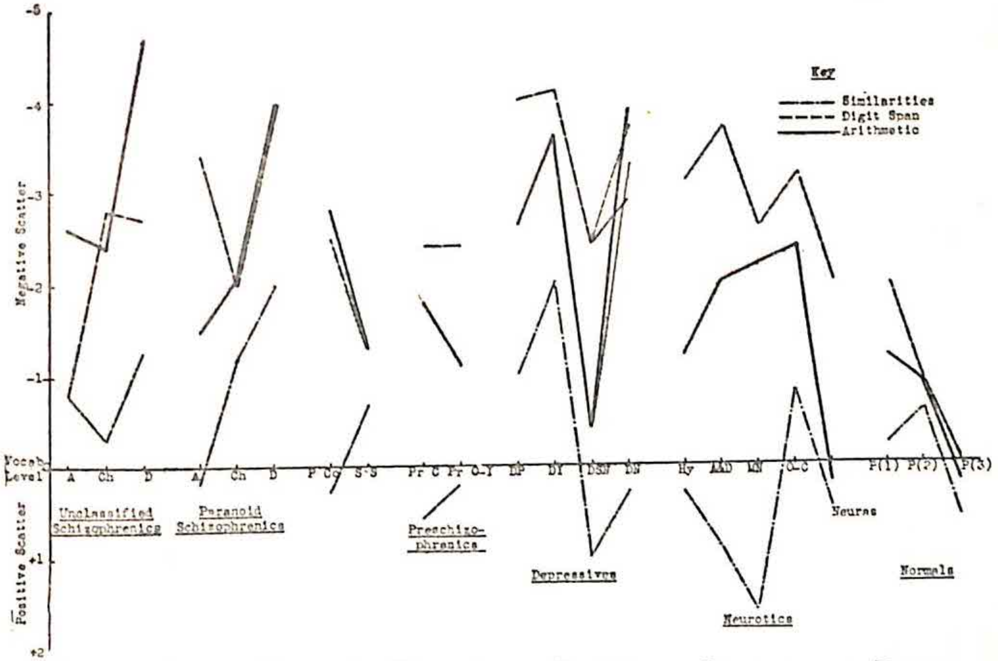
Special Figure 1: This graph in its various sections represents the average Vocabulary Scatter of each group on each subtest; these are the same averages that are presented in Special Table 1. They are presented graphically because we believe the trends will be revealed more clearly if perceived visually, and because graphs in general provide a better summary than a series of numbers which have to be read individually. In each of the sections of Special Figure 1, the names of the clinical and control groups are indicated along the horizontal axis. The points above this axis represent negative Vocabulary Scatter, or in other words average subtest scores below the Vocabulary level. The points below the axis represent positive Vocabulary Scatter, or average subtest scores above the Vocabulary level. Since it would have been confusing to plot the Vocabulary Scatter of all the subtests on the same graph, with an overlapping of 11 graph lines, we decided to make several graphs with the average Vocabulary Scatters of no more than 3 subtests on any one. The specific subtests represented simultaneously on any graph were not chosen at random, but, as the reader will see in the following sections, were chosen to facilitate comparisons which proved to be of both diagnostic and theoretical significance in our work.



SPECIAL FIG. 1: GRAPH 1.—VOCABULARY SCATTER OF COMPREHENSION AND INFORMATION

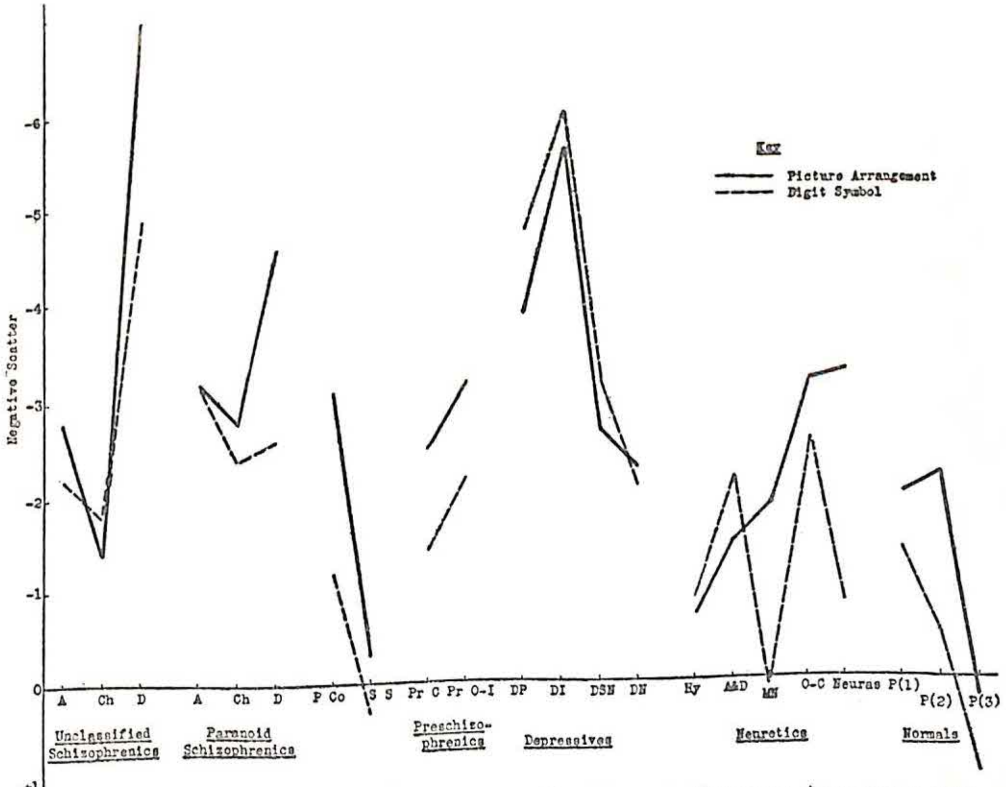
Group Averages

Special Table 2: This table presents, first, for the 4 essentially Verbal subtests, the Mean Scatter of each group from the Verbal Mean. Thus,



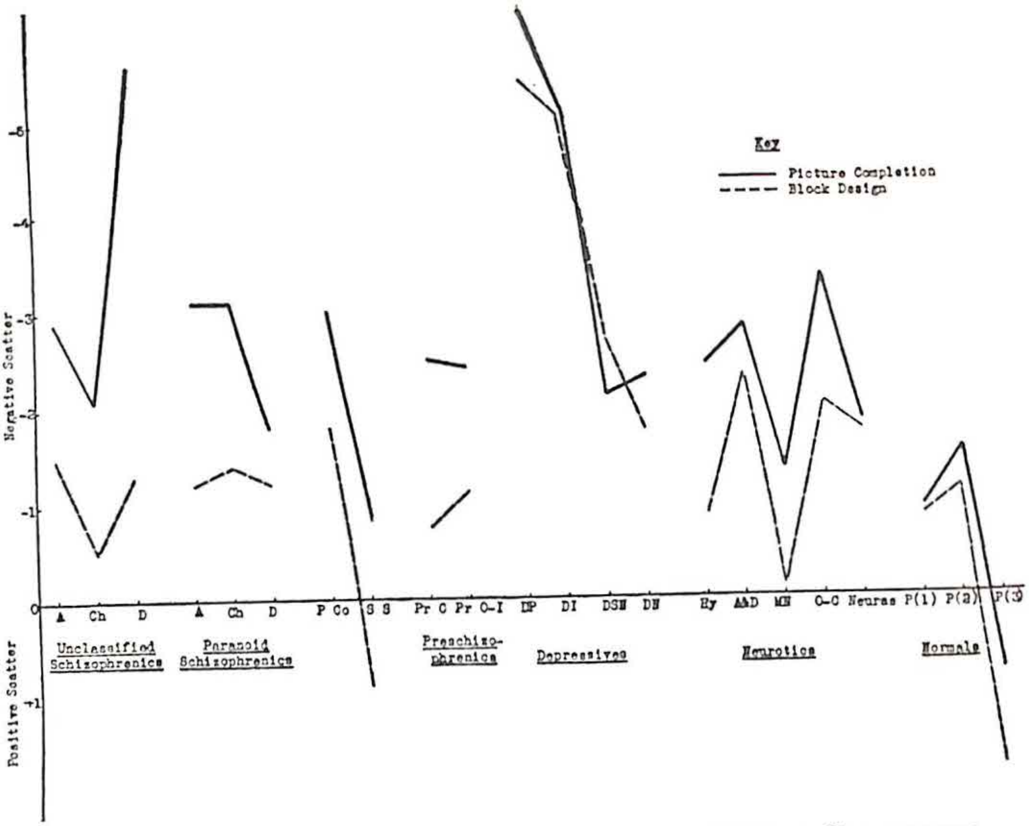
SPECIAL FIG. 1: GRAPH 2.—VOCABULARY SCATTER OF SIMILARITIES, DIGIT SPAN, AND ARITHMETIC

Group Averages. (The thinner lines referring to the DN group indicate a correction made for a schizoid case)



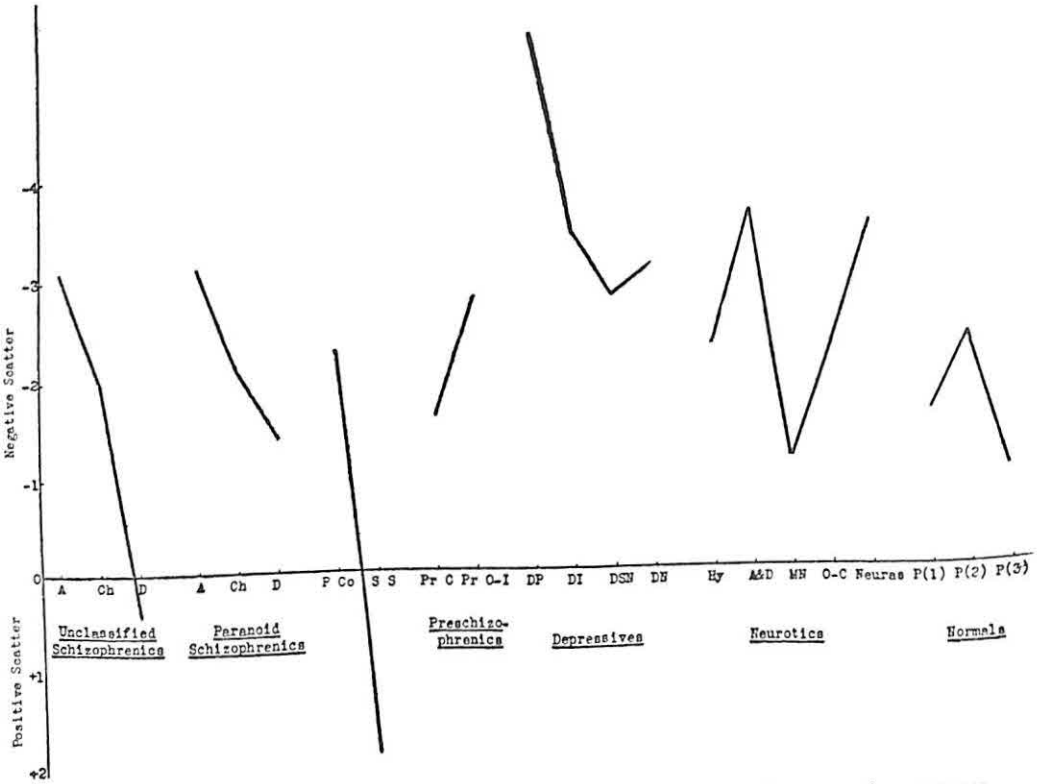
SPECIAL FIG. 1: GRAPH 3.—VOCABULARY SCATTER OF PICTURE ARRANGEMENT AND DIGIT SYMBOL

Group Averages



SPECIAL FIG. 1: GRAPH 4.—VOCABULARY SCATTER OF PICTURE COMPLETION AND BLOCK DESIGN

Group Averages



SPECIAL FIG. 1: GRAPH 5.—VOCABULARY SCATTER OF OBJECT ASSEMBLY

Group Averages

SPECIAL TABLE 2.—*Average Mean Scatter of the Subtests and the Significance of the Difference from Zero* (t-test)*

Group	N	Vocabulary			Comprehension			Information			Similarities			Picture Arrangement			Picture Completion			Object Assembly			Block Design			Digit Symbol		
		M	σ_M	Signif.	M	σ_M	Signif.	M	σ_M	Signif.	M	σ_M	Signif.	M	σ_M	Signif.	M	σ_M	Signif.	M	σ_M	Signif.	M	σ_M	Signif.	M	σ_M	Signif.
U Sch A	17	+.5	.29	10–20%	−.6	.42	10–20%	+.5	.38	20%	−.4	.48		−.3	.46		−.4	.47		−.6	.57		+1.1	.37	<1%	+.3	.47	
U Sch Ch	13	+.6	.28	5%	−1.7	.45	<1%	+.8	.37	5%	+.3	.37		+.2	.54		−.5	.80		−.4	.84		+1.0	.46	5%	−.3	1.07	
U Sch D	7	+1.1	.72	10–20%	−1.9	.68	2–5%	+1.0	.53	10–20%	−.2	.75		−3.3	.87	<1%	−1.9	.68	2–5%	+4.1	.79	<1%	+2.4	.55	<1%	−1.2	.53	5–10%
P Sch A	11	+.3	.41		−1.0	.59	10–20%	+.2	.42		+.5	.71		−.5	.50		−.6	.88		−.4	.80		+1.5	.59	2–5%	−.5	.86	
P Sch Ch	10	+.9	.39	2–5%	−.4	.49		−.2	.48		−.3	.40		−.5	.82		−.7	.48	10–20%	+.2	.74		+.9	.60	10–20%	−.1	.74	
P Sch D	5	+1.2	.74	10–20%	−.6	.72		+.4	.86		−.8	1.20		−2.6	.68	1–2%	+.4	.88		+1.4	.76	10–20%	+1.0	1.09		−.4	.79	
P Co	13	+.3	.28		−1.2	.32	<1%	+.4	.23	10–20%	+.6	.44	20%	−.8	.61	20%	−.7	.50		−.1	.57		+.5	.60		+1.0	.71	10–20%
S S	9	−.3	.40		+.2	.30		+1.0	.45	5–10%	−.9	.61	10–20%	−.7	.74		−1.2	.54	5–10%	+1.4	.69	5–10%	+.5	.60		−.1	.68	
Pr C	16	−.4	.30	20%	−.7	.48	10–20%	+.8	.30	1–2%	+.3	.31		−.6	.50		−.7	.48	10–20%	−.2	.57		+1.2	.32	≪1%	+.3	.44	
Pr O-I	16	+.4	.34		−1.1	.25	≪1%	+.1	.29		+.6	.31	5–10%	−.8	.53	10–20%	−.1	.25		−.5	.48		+1.2	.35	<1%	+.2	.45	
DP	8	+1.1	.32	1%	−1.3	.78	10–20%	+.2	.77		+.1	.84		+.5	.62		−.2	.92		+.6	.95		−1.2	.43	2–5%	+.4	.78	
DI	7	+1.2	.58	5–10%	+.2	.65		−.6	.88		−.8	1.14		−.5	.50		−.1	.89		+1.5	1.07		+.1	.72		−1.1	.49	5–10%
DSN	9	0	.33		−.8	.38	5–10%	−.1	.40		+1.0	.59	10–20%	0	.74		+.6	.43	20%	−.1	.76		0	.48		−.4	.54	
DN	7	+.6	.22	2–5%	−1.6	.46	1–2%	+.1	.46		+.9	.38	5–10%	0	.45		0	.74		−.7	1.04		+.6	.31	10%	+.1	.59	
Hy	8	+.1	.24		−.1	.42		−.5	.29	10%	+.4	.30	10–20%	+.7	.46	10–20%	−1.0	.36	1–2%	−.9	.37	2–5%	+.4	.28	10–20%	+.5	.56	
A & D	10	−.4	.22	10%	0	.43		−.3	.36		+.5	.48		+1.0	.51	5–10%	−.3	.54		−1.1	.77	10–20%	+.2	.44		+.3	.49	
MN	9	−.7	.37	5–10%	0	.52		−.1	.41		+.9	.41	5–10%	−1.0	.42	2–5%	−.5	.56		−.2	.84		+.8	.57	20%	+1.0	.98	
O-C	16	+.4	.24	10–20%	−.6	.40	10–20%	+.6	.30	5–10%	−.4	.35		−.6	.37	10–20%	−.6	.39	10–20%	+.4	.48		+.7	.43	10–20%	+.1	.46	
Neuras	6	−.2	.40		−.4	.91		+.2	.57		+.3	.98		−1.1	.68	10–20%	+.4	.36		−1.3	.67	10–20%	+.6	.61		+1.4	.96	20%
P (1)	37	−.1	.18		0	.22		+.3	.19	10–20%	−.3	.19	10–20%	−.7	.38	5–10%	+.4	.34		−.2	.42		+.5	.24	2–5%	0	.32	
P (2)	17	0	.28		+.4	.36		+.1	.20		−.6	.20	<1%	−.7	.57		0	.41		−.9	.47	5–10%	+.5	.49		+1.1	.40	1–2%
P (3)	5	−.5	.28	10–20%	+.1	.54		+.3	.54		+.1	.90		−.4	1.05		+.2	.40		−1.6	.94	10–20%	+1.2	.33	2–5%	+.4	.48	

* The Verbal Mean was for each case the mean of the scores on Vocabulary, Comprehension, Information, and Similarities. Digit Span and Arithmetic were excluded from this computation. The Performance Mean was for each case the mean of the scores of the 5 Performance subtests.

the Chronic Unclassified Schizophrenics have a Mean Scatter of Comprehension 1.7 weighted score units below the Verbal Mean (−1.7). In the column of significances we see that this negative Mean Scatter is significant below the 1% level. This table presents, secondly, the Mean Scatter of each of the 5 Performance subtests from the Performance Mean. Thus, the Deteriorated Unclassified Schizophrenics have a Mean Scatter

SPECIAL TABLE 3—MEAN SCORE AND σ ON EACH SUBTEST

Total Population: 261 Cases

Subtest	Mean	σ
Vocabulary	12.0	2.1
Comprehension	11.4	2.6
Information	12.2	2.5
Similarities	12.0	2.7
Digit Span	9.8	3.3
Arithmetic	10.3	3.2
Picture Arrangement	9.6	3.1
Picture Completion	9.7	3.1
Block Design	10.8	3.1
Object Assembly	10.0	3.2
Digit Symbol	10.3	3.1

Significance of Difference between Standard Deviations

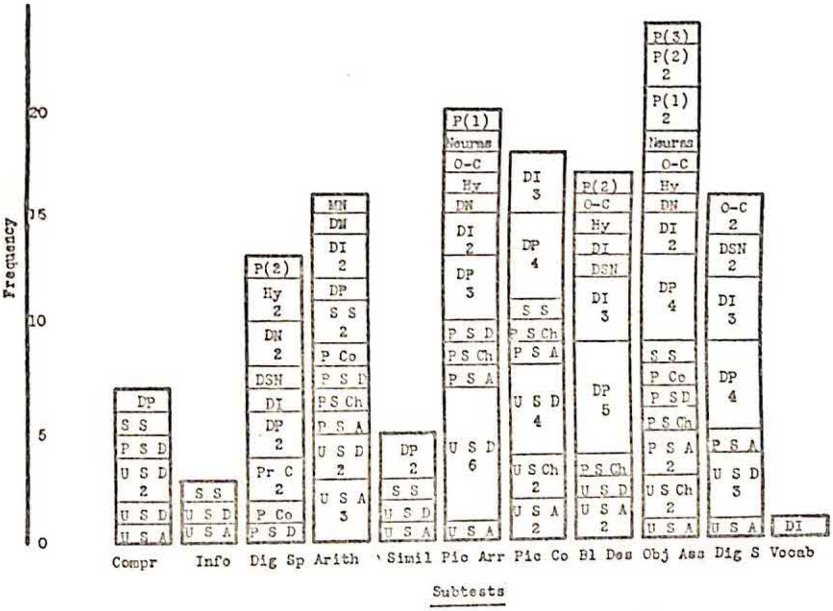
Subtests Compared	Critical Ratio	Significance
Vocabulary : Comprehension	3.33	<1%
Vocabulary : Information	2.86	<1%
Vocabulary : Similarities	4.00	<1%

on Picture Arrangement of −3.3, which is significant on a level below 1%. This table will also be referred to in the subsequent sections, when the means on different subtests will be compared and discussed. This table furthermore will be compared to Special Table 1. In this table too we have omitted all *t*-scores the significances of which are above 20%.

Special Table 3: This table presents the average scores of our entire combined clinical and control population on each of the 11 subtests, with the standard deviation of each average. One can easily determine, from the averages in this table, which of the subtests are the most vulnerable to impairment and which tend to be the best-retained in our groups as a whole. Frequent comparisons of vulnerability and stability will be made.

The standard deviations were included in this table because they represent the variability of scores in our population on each subtest, in other words, the tendency for the scores to be dispersed over the 18 point scale. Comparisons of the variability of scores on each of the subtests will also be made, and in many cases will be of crucial importance.

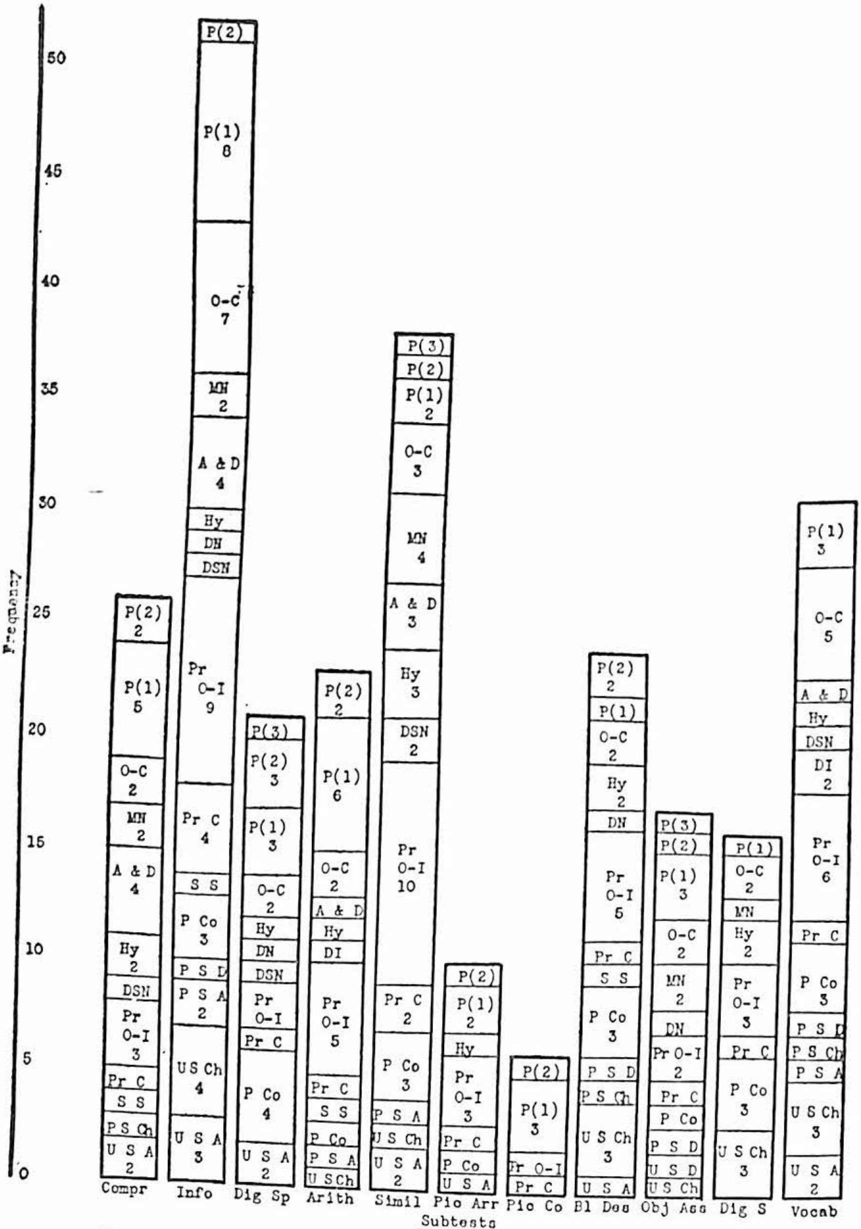
Special Figure 2: This figure presents in bar graph form the absolute number, for each of the subtests, of cases who have weighted scores of 5 or less. In other words, this figure represents the incidence of extremely low weighted scores in the various groups. Each bar stands for a subtest, and the divisions of each bar for different groups. The graph makes it immediately apparent to the reader how rare are such extremely low scores on some of the subtests, and how much more frequent on others. Comparisons and conclusions based on this graph will be presented throughout the following sub-sections.



Special Fig. 2.—Extreme Low Weighted Scores

(The numbers under the abbreviations of the names of clinical groups indicate the number of cases in the group who had such extremely low scores. For the score limits, see Table 5.)

Special Figure 3: This figure presents in bar graph form the absolute number, for each subtest, of cases who have weighted scores of 15 or more. In other words, it gives the incidence of cases with extremely high weighted scores in the various groups. The graph makes it immediately apparent how some subtests are much more prone than others to have high weighted



SPECIAL FIG. 3.—EXTREME HIGH WEIGHTED SCORES
(The numbers under the abbreviations of the names of clinical groups indicate the number of cases in the group who had such extremely high scores. The limits are a weighted score of 15 or above.)

scores. Specific discussion of this figure will recur throughout the following pages.

Appendix II (pages 515 ff.) presents all the weighted score data on all subtests of the Bellevue Scale for all of our population.

Before turning to the analysis of individual subtests, we must point out that there are four main divisions into which the subtests fall: (1) 4 subtests which are essentially Verbal—Vocabulary, Information, Comprehension, and Similarities; (2) 2 subtests measuring the related functions of attention and concentration—Digit Span and Arithmetic; (3) 2 subtests dependent to a large extent on visual organization—Picture Arrangement and Picture Completion; (4) 3 subtests which are primarily visual-motor coordination tests—Block Design, Object Assembly, and Digit Symbol. It will become clear to the reader in the following sections that there is a psychological rationale to these four major groupings.

E. VOCABULARY

1. Introduction. The Vocabulary subtest of the Bellevue Scale consists of 42 items;[22] each of these, if satisfactorily passed, gives a raw score of one, and if only precariously passed, a raw score of ½. The raw scores are added, and the sum is then translated into a weighted score. Under usual testing conditions the Vocabulary score is not used in calculating the I.Q., which is obtained from the 5 Verbal and 5 Performance tests only. The Vocabulary test may be used however as a substitute for any Verbal subtest, if for special reasons one of these cannot be given or cannot be considered a fair test.

There are two reasons for dealing with the Vocabulary subtest first in this chapter: (a) as pointed out above, Vocabulary has a special position in the Bellevue Scale and did not enter our I.Q. computations; (b) as pointed out in the introductory section on scatter, Vocabulary is one of the most stable subtests, and therefore serves as a scatter base or, in other words, a basis of comparison for the impairments of the other tests.

2. The Psychological Rationale of the Vocabulary Subtest. The special position of verbalization among, and in relation to, all psychological processes, as well as the special position of Vocabulary among all other test items applied in intelligence tests, has been long recognized. It is another question whether the implications of this recognition were conceived to constitute as serious a problem as they do. A few pertinent considerations should be gone into here.

On the basis of the observation that Vocabulary seemed to be the most stable and least deteriorating aspect of intelligence yet approached in intelligence testing, Babcock (1)[23] built a deterioration test. In this test, the comparison of the Vocabulary level with the achievements on other types of tests yields measures by which deterioration or inefficiency can be measured. Yacorzynski (32) has pointed out that the non-deteriorative character of vocabulary is really an illusion, and that the basis of this illusion lies in the fact that different levels of definitions of the words are acceptable. Though a patient may use a lower level of vocabulary definition than he did originally, he can still pass. Thus, in the vocabulary misses, only the gross impairments of vocabulary will show up. The Bellevue Vocabulary subtest allows for half scores on primitive levels of definition, and thus to a certain extent takes into account the point objected to by Yacorzynski. However, it remains true that the Bellevue Vocabulary, like all the other Vocabulary tests, indicates on the whole only the grossest inefficiencies of vocabulary. Though an exploration of the point raised by Yacorzynski, and a thorough study of the structure of vocabulary and the level of verbalizations used, would be highly important, the present authors believe that the general method of using the vocabulary as a "standard" is not a faulty one. Clinical experience teaches that vocabulary, once achieved, will be quite refractory to impairment by temporary or sustained inefficiency and deterioration, though it may change its form of functioning to levels of definition (that is, conceptualization) which are much less adequate than those used by the patient at the time when his vocabulary reached its greatest scope and efficiency. Although vocabulary test studies tend to exaggerate the stability of the vocabulary function, they nevertheless do bring to expression its highly stable nature. In the following discussion it will be demonstrated that, on the one hand, this refractoriness to deterioration and impairment is only relative; and that, on the other hand, it is greater than that of other relatively stable groups of Verbal items, and certainly greater than that of the easily impaired Performance items.

---

[22] See Wechsler (28), p. 180.

[23] The reference to Babcock in these volumes pertains to Babcock's early work.

Another point concerning the nature of vocabulary is equally important. To state it in an exaggerated form, *vocabulary is primarily dependent upon the wealth of early educational environment, and is refractory to improvement by later schooling and life experience*. The evidence for this contention is much more the clinical experience of the authors than statistical. Clinical experience appears to show that the wealth of stimulation and width of horizon open in the childhood home and environment, rather than the extent of schooling and variety of life experience, influence basically the scope of vocabulary. These relationships are in many cases clouded, because schooling and life experience do enlarge vocabulary to some extent; but the authors have been impressed by how many persons of a culturally poor childhood environment remain limited in their vocabulary despite schooling and life experiences of great variety. Besides original environment, schooling, and variety of life experience, there appears to be a fourth factor which influences the vocabulary. This factor is concerned with the specific character of an individual's intellectual functioning, and should be discussed in detail.

In the introductory considerations of intelligence, we pointed out that what is called intelligence is an accumulation of memories of events and relationships, or data concerning relationships; and that this accumulation depends upon "undisturbed functioning". We pointed out that original endowment corresponds, to an extent, to the strength of "function"; that progressive unhampered maturation is an expression of the absence of disturbance of "function"; and that in the course of maturation the undisturbed "function" picks up all the wealth of data and relationships, and assimilates and organizes them into the form in which they are later at the disposal of the individual. This "function", however, is not qualitatively identical for every individual, and only quantitatively different in each. On the contrary, there appear to be great qualitative differences in this "function". It is embedded into the personality organization, and is undiscernible from it; and the formation of personality and its characteristics is at the same time the formation of this "function" and its characteristics. Where a "see no evil, hear no evil, speak no evil" make-up characterizes the whole personality, it will be reflected in the "function" underlying intelligence. This "function" will be different in a personality which can be characterized by the slogan "I have to know everything in order to do the right thing."[24] The psychological concept of "repression" refers to the submergence in the unconscious of information or knowledge already possessed, because of the danger hidden in that knowledge for the psychological equilibrium of the individual.[25] Knowledge cannot be assimilated unless it is assimilated with other freely available knowledge; and once repression plays a pathological rôle, it tends to become ever more extensive, and with it the accumulation of knowledge is limited. Thus, we deal here with a type of function which will tend to assimilate and accumulate less information, less cultural wealth, less vocabulary. On the other hand, when the personality make-up is such that intellectual knowledge becomes the most important conscious weapon against the onslaught of the feared unknown, a different situation is encountered. These cases, the psychodynamics of which are characterized by intellectualization—or libidinization of thought-processes, to use the psychoanalytical terminology—are on the whole found in extreme form in the groups of patients labeled as compulsive and obsessive personalities. It is these who, under stress and strain, usually decompensate into obsessional and compulsion neuroses. Similar psychodynamics are also prominent in the group labeled, in our nosological categorization of patients, as Over-Ideational Preschizophrenics. In these cases, the "function" underlying intelligence is one that is over-sharp and over-keen in picking up as much factual information, knowledge of relationships, and vocabulary as is possible.

---

[24] In general, we should not be aware of more than the right thing that is to be done; the "coming to consciousness" of more than the right thing is the basis of "doubt".

[25] See Rapaport: "Emotions and Memory" (22).

Thus, in evaluating vocabulary achievement one must keep in mind, first, that the basic point in the "psychology of vocabulary" is the relatively refractory nature of vocabulary to deterioration; second, that given an undisturbed "function" and an unhampered process of maturation, vocabulary depends for its development more upon original wealth of educational environment than upon late schooling and variety of life experience; third, that when "function" is disturbed in the beginning, the lack of vocabulary attainment will reflect it; and fourth, that not only the disturbed or undisturbed condition of the "function", but the specific quality of the disturbance of the function—namely, its readiness either to accumulate or to avoid accumulating information and knowledge—plays also a crucial rôle in the development of vocabulary. We shall see, in the following discussions of vocabulary, that the group usually characterized clinically by the pre-eminence of the mechanism "repression"—namely, the Hysteria group—tends to have a relatively low Vocabulary score, Information score, and so forth; while the group characterized by intellectualization—namely, the Obsessive-Compulsive group—tends to have a high Vocabulary score, Information score, and so forth. In connection with the Simple Schizophrenias, the effect on vocabulary of an original disturbance in function will be seen. In connection with our control group of normals—which, as far as early educational environment is concerned, is at a relative disadvantage compared to our clinical groups—we shall see the intellectual and cultural differences come into relief. In connection with the Deteriorated groups, we shall see that the refractoriness of the vocabulary to deterioration is only relative; and we shall also see the limits of this refractoriness.

3. Administration. On Vocabulary subtest administration, there are only a few points that should be added to the instructions and scoring samples of the Bellevue Manual.

First: wherever a peculiar verbalization—associations instead of definitions, sound-alliterations, and so on—occurs, inquiry is mandatory.

Second: where the patient flatly states, "I don't know", inquiry is superfluous; but where hesitation, hedging, embarrassment, or uncertainty are apparent, inquiry should be made. In such cases, "catacomb" may turn out to be "honeycomb", "proselyte" may be "a bad woman", "traduce" may mean "seduce", and so on.

Third: wherever the relationship between the word in question and its definition by the patient is unclear to the examiner, inquiry to ascertain the relationship in the mind of the patient should be made. Arbitrary non-related definitions are psychotic indications, and occur otherwise only in pretentious psychopaths.

Fourth: though after five missed items the examiner may correctly consider the subtest administration finished, it is advisable to check the response of the patient to a few following, but relatively easy, items, such as harakiri. It may occur that five items are missed due to fortuitous conditions.

4. Item Analysis of the Vocabulary Subtest. The *basis* of item analysis is the experience that the different words included as items in the Vocabulary subtest show wide discrepancies in difficulty. The *aim* of item analysis is to discover whether there are individual items on which failure is characteristic for any clinical group, and if so—as clinical experience appears to indicate—which they are. We have tried to show in our item analysis that the misses *are* meaningful and not random, and can be used as aids in diagnosis.

The reservations the reader must keep in mind in this section are:

(a) The degree of difficulty of the items was established by us from the performance of a mediocre group, and applied diagnostically to clinical groups of originally good background.

(b) The misses on one level of difficulty become diagnostically significant only if and when items of a higher degree of difficulty are passed by the same subject; otherwise, misses tell us only of the level of attainment.

(c) A mechanical application of the results of item analysis, without regard for the patient's general intelligence level, can only be misleading.

Clinically, we usually formulated a crude item-analysis of Vocabulary in two parts. The first part of the test, 21 words, should not as a rule contain failures, as long as function is unimpaired by maladjustment. The second part falls into two subparts. To pass approximately the first 10 words of the second part requires more information, more study, more experience than to pass the 21 words of the first part, which can be easily picked up by "unimpaired function" in everyday experience. To pass the last 11 words of the second part requires usually special cultural predilection, special schooling, and experiential stimulation. Thus, a failure on the first half of the test should be indicative of impairment and maladjustment, if the intelligence level is not extremely low in the first place; but failure on the second part may be an overlapping, or fusion, of maladjustment and lack of sufficient education or schooling. The last part is useful only with reference to the cultural level of the subject.

Statistical analysis of the misses differentiates, however, four groups of items and points out more specifically the exceptions to the above description. The basis for the analysis has been taken from the data of the normal control group. This analysis shows that the *well-adjusted group* *of our patrolmen* missed no item of numbers 1–13, 18, and 20,[26] though they had half scores on 2% of their chances on these items. In this group of items, failure to obtain full score was considered a miss in our statistical treatment. In the other groups of Vocabulary items, the statistical analysis did not consider the half scores as misses. The reasoning behind this decision was that in the first group the items are so simple that well-adjusted people should not make even half misses on them; but in the latter three groups, the difficulties of the items are great enough that only the full misses may give us diagnostic clues. The *total group of our patrol* showed .7 per cent misses of all chances on the 15 items of the first group; on the second group, consisting of items 14–17, 19, 21, 22, 24–28,[27] the patrol showed 9.9 per cent misses; on the third group, consisting of items 23, 29–35,[28] the patrol showed 50 per cent misses; and on the fourth group, consisting of items 36–42,[29] the patrol showed 91.8 per cent misses.

Following this very consistent increase of difficulty as reflected in the percentage of misses, we analyzed all our groups for this breakdown of Vocabulary items.

Figure 8 represents the percentage of misses of all our groups, clinical and control; the units of the vertical axis are the percentage of missed items in all chances. The four graphlines represent in ascending order the four item-groups of increasing difficulty into which the Vocabulary subtest was divided.

As we have 15 items in the group of first degree of difficulty, 6 to 7 per cent misses is equivalent to one miss in each case. The graph clearly shows that this criterion is met only by the Deteriorated Schizophrenic, the Simple Schizophrenic, and the two Depressive Psychosis groups. Other striking features of this graphline are the following: 1. The Neurotics seem to be all on an even level, with only the Obsessive-Compulsives tending to be somewhat lower in their percentage of misses; 2. The Over-Ideational Preschizophrenics (who have been referred to above, together with the Obsessive-Compulsives, as a group which tends to "intellectualization"), and the Paranoid Conditions (a kindred group, in this sense) tend to have the lowest percentage of misses of all the clinical groups; and (3) the Patrol tends to have the lowest percentage of misses of all the groups, in spite of the fact that its general educational background and cultural level is lower than that of our general clinical population. The Paranoid Conditions and Over-Ideational Preschizophrenics, and to some extent the Obsessive-Compulsives, approach or are on the same level as the Patrol in percentage of misses. In other words, the percentage of misses on these easiest items is low where there is no impairment (Patrol) or where the maladjustment is of an intellectualizing character.

Let us now turn to the statistical evaluation of the differential significance of these percentages in Tables 7-A and 7-B. They show that the greatest percentage of misses occurs in the Depressive Psychoses, who have significantly more misses than the next worst Schizophrenic group; the Depressive Neuroses and Neurotics[30] run about the same in third place; the Patrol, and the combined Paranoid Condition and Over-Ideational Preschizophrenic group, have the fewest misses of all.

---

[26] 1. Apple; 2. Donkey; 3. Join; 4. Diamond; 5. Nuisance; 6. Fur; 7. Cushion; 8. Shilling; 9. Gamble; 10. Bacon; 11. Nail; 12. Cedar; 13. Tint; 18. Plural; 20. Nitroglycerine.

[27] 14. Armory; 15. Fable; 16. Brim; 17. Guillotine; 19. Seclude; 21. Stanza; 22. Microscope; 24. Belfry; 25. Recede; 26. Affliction; 27. Pewter; 28. Ballast.

[28] 23. Vesper; 29. Catacomb; 30. Spangle; 31. Espionage; 32. Imminent; 33. Mantis; 34. Harakiri; 35. Chattel.

[29] 36. Dilatory; 37. Amanuensis; 38. Proselyte; 39. Moiety; 40. Aseptic; 41. Flout; 42. Traduce.

Tables 7-C and 7-D present the distribution of the percentage of cases having one or more misses on this group of easy items. The differences in distribution are less significant here than in the tables set up in terms of items missed, because of two factors: first, the relatively small number of cases in some of these groups; second, and probably more important, a massing of misses in a few cases which occurred in some groups, such as the Depressive Psychoses—so that although they came out significantly different from the Schizophrenics in regard to the percentage of misses occurring in the whole group, the percentage of cases having such misses was not significantly different. Yet the same trend as in Tables 7-A and 7-B is present: the greatest percentage of cases with such misses are in the Depressive Psychoses, next in the Schizophrenics, next in the Neurotics and Depressive Neuroses, and least of all in the Paranoid Conditions, Over-Ideational Preschizophrenics, and our normal control group.

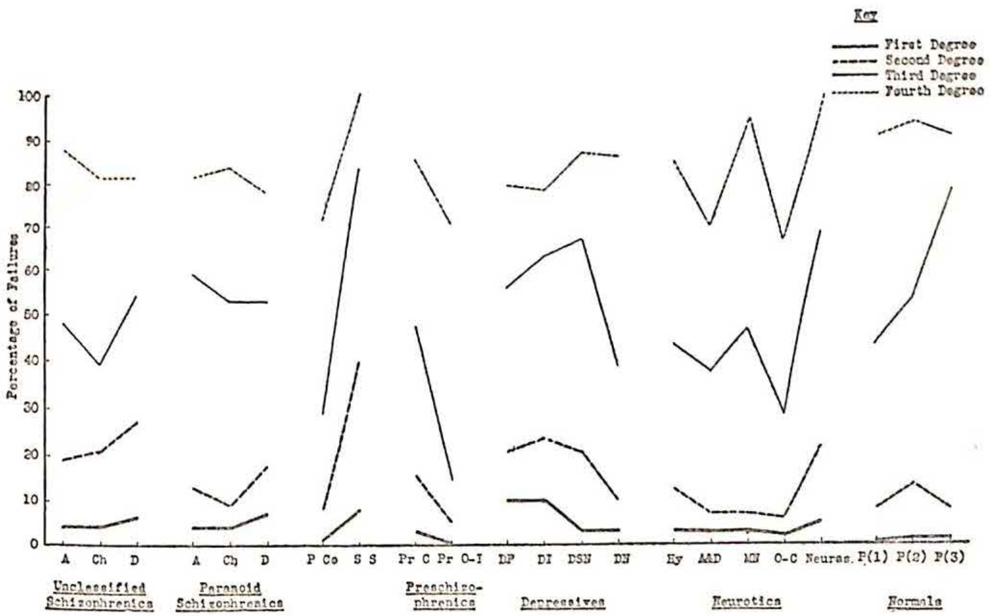


FIG. 8.—ITEM ANALYSIS OF THE VOCABULARY SUBTEST
Percentage of Items Failed at Each of the Four Degrees of Difficulty

Diagnostically, then, we may conclude that several misses on these easy items may be expected only in Depressive Psychoses; one or two misses may be expected from Schizophrenics, with perhaps more in the Deteriorated and Simple Schizophrenics; and in the Neurotics and Normals not more than one sporadic miss, explainable as a result of a relatively poor educational environment and/or a "temporary inefficiency".

---

[30] Since the Neurasthenics differ markedly from the rest of the Neurotic groups in having a much larger percentage of misses on these easy items, they were removed from the Neurotic group for this statistical test.

TABLE 7-A.—*Percentage of Misses on Easy Vocabulary Items*
Items 1-13, 18, 20

Group	No. of Cases*	No. of Chances	No. of Misses	% Missed
(P + U) Sch.	61	915	40	4.4
DP + DI	11	165	16	9.7
DSN + DN	16	240	6.5	2.7
Neurotics	55	825	23.5	2.8
Neurotics − Neuras	49	735	19.0	2.6
Total Patrol	54	810	6	.7
Patrol (1)	32	480	2	.4
Patrol (2)	17	255	3.5	1.4
P Co + Pr OI	29	435	2.5	.6

* Due to certain inadequacies of notation on the test blanks, an item analysis was not possible for a small percentage of our cases.

TABLE 7-B.—*Differential Significance of Frequency of Misses on Easy Items*

Groups Compared	Chi²(d.f. = 1)	Significance
(P + U) Sch : (DP + DI)	6.84	<1%
(P + U) Sch : (Neurotics − Neuras)	3.49	5-10%
(P + U) Sch : Patrol	22.92	<<1%
(P + U) Sch : (P Co + Pr OI)	13.56	<<1%
(DP + DI) : (DSN + DN)	9.59	<1%
(DP + DI) : (Neurotics − Neuras)	18.33	<<1%
(DP + DI) : Patrol	45.07	<<<1%
(DSN + DN) : Patrol	5.44	2%
(Neurotics − Neuras) : Patrol	7.98	<1%
(Neurotics − Neuras) : Patrol (1)	8.04	<1%
(Neurotics − Neuras) : (P Co + Pr OI)	6.13	1-2%

Figure 8 also indicates the percentage of misses in each clinical and control group on the Vocabulary items of second degree of difficulty. This group of items was segregated from the first, although it contains "easy" items, because on it the Patrol shows 9.9 per cent of full misses, while on the first group of items it showed no full misses. 8 per cent of misses in any one group is equivalent to an average of one miss for each person in the group. This graphline also is clinically diagnostic. The Unclassified Schizophrenics, the Deteriorated Paranoid Schizophrenics, the Simple Schizophrenics, the Coarctated Preschizophrenics, the Depressive Psychotics and Severe Neurotic Depressives, and—among the Neurotic groups—the Neurasthenics, tend

TABLE 7-C.—*Percentage of Cases with One or More Full Misses on Easy Items*

Group	No. of Cases	% Who Missed
(P + U) Sch.	61	43
DP + DI	17	55
DSN + DN	16	19
Neurotics − Neuras	53	29
Total Patrol	54	2
P Co + Pr OI	29	3

TABLE 7-D.—*Differential Significance of Percentages of Cases*

Groups Compared	Chi^2(d.f. = 1)	Significance
(P + U) Sch : (DP + DI)	.16	50–70%
(P + U) Sch : (Neurotics − Neuras)	1.75	10–20%
(P + U) Sch : Patrol	24.28	<<<1%
(P + U) Sch : (P Co + Pr OI)	12.56	<<1%
(DP + DI) : (DSN + DN)	2.32	10–20%
(DP + DI) : (Neurotics − Neuras)	1.68	20%
(DP + DI) : Patrol	21.21	<<<1%
(Neurotics − Neuras) : Patrol	12.67	<<1%

TABLE 8-A.—*Percentage of Misses on Vocabulary Item-Groups 2, 3, 4*
(Group 2: 14–17, 19, 21, 22, 24–28; Group 3: 23, 29–35; Group 4: 36–42)

Group	No. of Cases	Amount of Misses			% Missed of All Such Items		
		2	3	4	2	3	4
(P + U) Sch.	61	131	242	354	18	50	83
DP + DI + DSN	20	53	101	115	22	63	82
Neurotics − Neuras	49	52	154	272	9	39	79
Total Patrol	54	64	216	347	10	50	92
P Co + Pr OI	29	21	50	143	6	22	70

to average two and a half or more on the items of this second group. The greatest percentages of misses among these are encountered in the Deteriorated Schizophrenics, in the Simple Schizophrenics, and in the Depressive groups mentioned.

Table 8-A presents the percentage of each item group missed by the major groups; and Table 8-B the differential significance of the percentages in the different groups.

The Chi² measures indicate that the Schizophrenics and the Psychotic and Severe Neurotic Depressives have significantly more misses on the Vocabulary items of second degree difficulty than do the Neurotics (excluding the Neurasthenics), the Patrol, and the combined Paranoid Condition and Over-Ideational Preschizophrenic groups.

TABLE 8-B.—*Differential Significance of Amount of Misses on Group 2 Items*

Groups Compared	Chi² (d.f. = 1)	Significance
(P + U) Sch : (DP + DI + DSN)	2.32	10–20%
(P + U) Sch : (Neurotics − Neuras)	23.10	1%
(P + U) Sch : Patrol	18.79	1%
(P + U) Sch : (P Co + Pr OI)	27.48	1%
(DP + DI + DSN) : (Neurotics − Neuras)	28.23	1%
(DP + DI + DSN) : Patrol	21.87	1%
(Neurotics − Neuras) : Patrol	.35	50–70%
(Neurotics − Neuras) : Patrol (2)	3.52	5–10%

TABLE 8-C.—*Percentage of Cases with Two or More Misses on Group 2 Items*

Group	No. of Cases	% ≧ 2
(P + U) Sch.	61	41
DP + DI	11	55
DSN + DN	16	50
Total Depr..	27	52
P Co + Pr OI	29	10
Neurotics − Neuras.	49	20
Total Patrol	54	28

TABLE 8-D.—*Differential Significance of Percentages of Cases*

Groups Compared	Chi²(d.f. = 1)	Significance
(P + U) Sch : Total Depr..	.51	30–50%
(P + U) Sch : (Neurotics-Neuras)	4.40	2–5%
(P + U) Sch : Patrol	1.66	20%
(P + U) Sch : (P Co + Pr OI)	7.24	<1%
Total Depr : (Neurotics-Neuras)	6.58	1%
Total Depr : Patrol	4.02	2–5%
Patrol : (Neurotics-Neuras)	.41	50–70%

It is noteworthy that the Borderline-Adjusted Patrol tends to have more misses than even the Neurotics, although the Vocabulary efficiency of the Neurotics should be considered somewhat impaired from their original level. This difference may be attributed to the disturbing effect of a precarious adjustment on the relatively poor vocabulary achievements of these Patrolmen.

Table 8-C and 8-D present the statistical analysis in terms of percentage of cases having two or more misses on words of second degree difficulty. Here again Schizophrenics and Depressives show the greatest percentage of such cases. The total Patrol, however, shows merely a mild trend to have fewer than the Schizophrenics. If we keep in mind that in terms of the *percentage* of misses by the entire group the Schizophrenics were significantly differentiated from the Patrol, this new finding in terms of *cases* indicates that the great percentage of misses in the Schizophrenic group is due to a massing of misses in a few cases.[31]

We conclude that cases missing two or more of the 12 items of second degree difficulty are likely to be psychotic or very depressed. A neurasthenic condition may also account for many misses on this level, and so may a precarious adjustment of a normal with little cultural support for vocabulary achievement.

The third graphline in Figure 8 gives the percentage of misses for each clinical and control group on Vocabulary items of third degree difficulty (items 23, 29–35). This group of items was segregated because the patrol group showed 50 per cent misses on it, while missing only 9.9 per cent on items of second degree difficulty. Table 8-E presents the differential significance of misses on this group of items. The graph as well as the table clearly indicates the cultural differences of our control group to be a major factor in their Vocabulary performance. This is seen in the fact that the Patrol has a higher percentage of misses than the Schizophrenics, and is exceeded only by the Psychotic and Severe Neurotic Depressives. On the other hand, the Neurotics excluding the Neurasthenics, and the Paranoid Conditions and Over-Ideational Preschizophrenics, have fewer misses than the Patrol group. The graph shows that the Well-Adjusted Patrol miss fewer items than the Borderline and Maladjusted Patrol, again indicating the effect of precarious adjustment upon a socially unrewarded

TABLE 8-E.—*Differential Significance of Amount of Misses on Group 3 Items*

Groups Compared	Chi^2(d.f. = 1)	Significance
(P + U) Sch : (DP + DI)	8.52	<1%
(P + U) Sch : (Neurotics-Neuras)	9.00	<1%
(P + U) Sch : Patrol	same % : not tested	
(P + U) Sch : (P Co + Pr OI)	46.84	<<<<1%
(DP + DI + DSN) : (Neurotics-Neuras)	25.81	<<<1%
(DP + DI + DSN) : Patrol	7.75	<1%
(Neurotics-Neuras) : Patrol	9.51	<1%
(Neurotics-Neuras) : Patrol (2)	9.07	<1%

---

[31] A similar explanation holds true for all other comparisons of results where the differentiation in terms of cases is less clear than the differentiation in terms of percentage of misses for total groups.

function. On the other hand, the Neurotics in general, in spite of their more or less serious pathology and the probable impairment of their Vocabulary from its original level, still miss much fewer items than the so-called Normals. We believe this relative preservation of the Vocabulary efficiency to be due to the cultural support of the development of this function, as well as to the refractoriness of vocabulary to impairment.

The third graphline in Figure 8, as well as Tables 8-A and 8-E, indicate that the percentage of misses on items of third degree of difficulty is lowest in the Paranoid Conditions, the Over-Ideational Preschizophrenics, and the Obsessive-Compulsives—the three groups whose "intellectualization" is their outstanding clinical characteristic. The excellent preservation of Vocabulary in these specific groups is due then, not only to a richer cultural background, but also to their extensive use of intellectual activity as a mechanism of defense.

Diagnostic conclusions from the amount of misses on these Vocabulary items of third degree of difficulty are difficult to establish. Many misses on these items may reflect, on the one hand, a psychotic impairment of an originally well-developed Vocabulary function, especially if items of fourth degree of difficulty are well passed; or, on the other hand, it may reflect merely the effect of slight maladjustment on the Vocabulary efficiency of individuals with a poor educational and environmental background, where items of fourth degree of difficulty are failed. An excellent performance on these items will occur in well-adjusted and highly intelligent people, or in patients characterized by a very strong striving toward "intellectualizing".

The fourth graphline of Figure 8 represents the percentage of misses on the seven most difficult Vocabulary items. The graph clearly shows that the lowest percentage of such misses is again found in Obsessive-Compulsives, the Over-Ideational Preschizophrenics, and the Paranoid Conditions. A fourth group, the Anxiety and Depression group, here attaches itself to these groups. In the lower levels of difficulty there was a visible tendency in this group to have a low percentage of misses.[32] The greatest percentage of misses occurs in the Simple Schizophrenic and the Neurasthenic groups. The other groups in general cluster around 85 per cent missed: only the Patrol has 90–95 per cent missed, which again emphasizes the cultural difference between our clinical and control cases.

---

[32] In general, on all the Verbal subtests of the Bellevue Scale there is a tendency for this group to be rather well-preserved. The reason is that persons included in this clinical category are compulsive individuals who have decompensated into a state characterized by anxiety and depression. The compulsive rigidity of their make-up brings them, in some respects, nearer to the Obsessive-Compulsives than to any other group. They do not share with the Obsessive-Compulsives those characteristics in which the Obsessive-Compulsives follow schizophrenic patterns. In other words, one may state that Anxiety and Depression cases represent a decompensation of a compulsive personality of a much more benign type than is that of the Obsessive-Compulsive Neuroses. Both of these groups, however, have a common tendency of their mode of "function" underlying intelligence, namely: to pick up a wide variety of knowledge and information, and to keep it relatively unimpaired in the onslaught of maladjustment. It is also worthwhile to note that the Anxiety and Depression group, which in other respects is frequently close to the Depressive groups, is here close to the Obsessive-Compulsive group. The peculiarity of this group's alternation between associating in scores with the Depressives and with the Obsessive-Compulsives will in itself shed some light on the nature of the functions which are most hit by the acute present condition (anxiety and depression), and which are more basically dependent upon the structure of the personality (compulsive structure).

Except for the cases who have a relatively low per cent of misses—that is, who pass two or three of the test items on this last item group—the passes or misses on these items of fourth degree of difficulty are not diagnostic; partly this is because of the great tendency in all the clinical and control groups to miss this group, partly because of the cultural differences to which it is strongly subject. Table 8-A presents the percentage distribution of misses in the major groups for these most difficult items.

5. The Variability of the Vocabulary Score. Since, in the analysis of all the subtests, Vocabulary will serve as one of the basic reference points to which all the rest of the subtests will be compared, we consider it necessary that Vocabulary be evaluated by a measure which is relatively independent of any individual group and its subtest scores. If Vocabulary is to be a basis for comparison, it must have a relatively great stability throughout all the groups, clinical and control.

In order to test the stability of Vocabulary—which has been assumed on the basis of past clinical experience, but of which no conclusive proof has been offered—we established the mean score on every subtest of the Bellevue Scale for our total population, clinical and control, and then established the standard deviations of these means. Special Table 3 presents these means and standard deviations. It shows that the standard deviation of the Vocabulary mean is the lowest of all the subtests, being equal to 2.1; next follow the standard deviations of Comprehension, Information, and Similarities, which all are in the range between 2.5 and 2.7. All the other subtests have higher standard deviations, ranging from 3.1 to 3.3. This means that Vocabulary scores show less dispersal over the 18 point scale than do the scores of any other subtest.

Special Table 3 indicates that the difference between the standard deviation of Vocabulary and the standard deviations of the subtests closest to it—namely, Comprehension, Information, and Similarities—is statistically significant on a level much below 1 per cent. In other words, there is much less than one chance in a hundred that this difference between the dispersal of the Vocabulary scores and the dispersal of the Comprehension, Information, and Similarity scores could come about purely by chance.

Thus, it can be considered statistically established that Vocabulary is the least variable subtest of the 11 subtests of this Scale. This finding further justifies our having used it as one of the bases for our scatter measures.

Table 9 presents the mean Vocabulary scores of each clinical group, which are also represented on Figure 9. The table clearly shows that, in conformity to the previous graph and theoretical expectation, the mean Vocabulary scores which are highest above the mean of the total population (= 12) are found in the Over-Ideational Preschizophrenics, Paranoid

Conditions, and Obsessive-Compulsives—in other words, in groups for which "intellectualization" and "libidinization of thought processes" are clinically characteristic. Also much higher than average is the Anxiety and Depression group who, as we have already stated, are compulsive persons decompensated to a state of anxiety and depression, but retaining enough of their original compulsive traits to sustain their high Vocabulary level.

Again in conformity to the graph, the lowest Vocabulary means are found especially in the Simple Schizophrenic group, and also in the Psychotic Depressives, Deteriorated Unclassified Schizophrenics, and Neurasthenics. Especially noteworthy here are the low Vocabulary scores associated with schizophrenic deterioration; thus, notwithstanding the usual assumptions, Vocabulary does *tend* to drop with deterioration. However, it remains less impaired than the other functions. One can only wonder what is implied in the low Vocabulary scores of the Simple Schizophrenics and the Neurasthenics. For the Simple Schizophrenics one might with some justification surmise that from the beginning their schizoid organization of personality was not conducive to developing verbal means of socialization. But low Vocabulary in the Neurasthenics is more difficult to understand, in the present state of our knowledge. It must be kept in mind that an acute disturbance characterized by general loss of "pep"—found also in Psychotic Depression—may have a specific effect on the availability of knowledge. The Psychotic Depressions are not deteriorative disorders but acute disturbances. In their acuteness, however, they

TABLE 9.—*Average Vocabulary Weighted Scores*

Average for Total Combined Population (261 cases) = 12.0

Group	Average	Group	Average
U Sch A	11.9	DP	10.2
U Sch Ch	12.4	DI	11.3
U Sch D	10.7	DSN	11.0
		DN	12.4
P Sch A	11.9		
P Sch Ch	11.9	Hy	12.2
P Sch D	11.6	A & D	13.4
		MN	12.0
P Co	13.2	OC	13.4
S S	9.8	Neuras	10.8
Pr C	12.0	P (1)	12.7
Pr OI	14.4	P (2)	11.7
		P (3)	11.6

seem to differ significantly from other acute disturbances such as the Acute Schizophrenias, which show no appreciable loss of Vocabulary. The Vocabulary level is apparently not much influenced by acute schizophrenic disturbance, but is dependent in such cases rather on the original development of intelligence.

Table 9 shows also that the Borderline-Adjusted and Maladjusted Patrol have a lower Vocabulary level than the Well-Adjusted Patrol; this further supports the findings and conclusions advanced above in connection with the frequency of missing Vocabulary items of increasing difficulty.

TABLE 10-A.—*Percentage of Cases with Vocabulary Weighted Score ≦10*

Group	N	% ≦ 10	Group	N	% ≦ 10
U Sch A	17	24	DP	8	50
U Sch Ch	13	31	DI	7	29
U Sch D	7	43	DSN	9	56
			DN	7	14
P Sch A	11	18			
P Sch Ch	10	10	Hy	18	22
P Sch D	5	40	A & D	10	0
			MN	9	22
P Co	13	8	OC	16	12
S S	9	67	Neuras	6	50
Pr C	16	25	P (1)	32	16
Pr OI	16	0	P (2)	17	41
			P (3)	5	20

Special Groups	N	% ≦ 10
U Sch	37	30
P Sch	26	19
DP + DI + DSN	24	46
(Neurotics-Neuras)	53	15
P Co + Pr OI	29	3

In order to complement the Vocabulary trends of the different groups as represented in Table 10 we analyzed statistically the frequency of occurrence of low Vocabulary scores in each. Table 10 shows that the greatest percentage of low Vocabulary scores occurs in the Simple Schizophrenics, the Psychotic and Severe Neurotic Depressives, and the Neurasthenics. In all these groups, at least half of the cases have "low" scores. The Deteriorated Schizophrenics and the Borderline-Adjusted Patrol also strongly tend to have low Vocabulary scores. These findings in general support those represented in Table 9. The relation between the Vocabulary efficiency of Acute and Deteriorated Schizophrenics, as well as between Well- and Borderline-Adjusted Normals, has already been discussed. It is noteworthy that the Paranoid Schizophrenics tend to have a better Vocabulary efficiency than the other Schizophrenics; this reflects the trend of paranoid disorders of all types toward a relative preservation of verbal functions.

TABLE 10-B.—*Differential Significance of Percentages of Cases*

Groups Compared	Chi^2(d.f. = 1)	Significance
U Sch : P Sch	.55	30–50%
(P + U) Sch (A + Ch) : (P + U) Sch D	1.15	20–30%
U Sch : (Neurotics-Neuras)	1.99	10–20%
U Sch : (P Co + Pr OI)	5.89	1–2%
U Sch : Patrol (1)	1.21	20–30%
P Sch : (P Co + Pr OI)	2.08	10–20%
SS : U Sch	2.80	5–10%
SS : P Sch	4.95	2–5%
(DP + DI + DSN) : U Sch	1.01	30%
(DP + DI + DSN) : P Sch	3.36	5–10%
(DP + DI + DSN) : (Neurotics-Neuras)	6.83	<1%
(DP + DI + DSN) : P (1)	4.74	2–5%
(Neurotics-Neuras) : Neuras	2.33	10–20%
Patrol (1) : Patrol (2)	2.66	10%
Patrol (1) : (P Co + Pr OI)	1.36	20–30%

We conclude that low Vocabulary scores are most diagnostic for severe Depressions, Simple Schizophrenias, and Neurasthenias. Deteriorative Schizophrenics, and precariously-adjusted Normals in a poor cultural setting, may also score low on Vocabulary.[33]

6. *Mean Scatter of the Vocabulary Subtest.* Another approach to the evaluation of the distribution of the Vocabulary scores is to compare the Vocabulary score to the Verbal Mean, omitting the Digit Span and Arithmetic scores from its computation.

Special Table 2 shows the significance of the deviation of Vocabulary from the Verbal Mean for all groups, clinical and control. On Figure 9 is represented the mean deviation for each group from its own mean verbal score, represented by the horizontal axis.[34] The graph indicates that in most groups the Vocabulary average is above the Verbal Mean. Strikingly enough, our total Patrol has a Vocabulary average and a Verbal Mean that coincide. The deviation from the Verbal Mean in the Neurotic groups is in general not large.[35] The deviation is greatest in the Schizophrenic and the Depressive Psychosis groups. Table 11-B shows these groups to be significantly differentiated in this respect from the Depressive Neurotics, Neurotics, and Patrol. A special Chi^2 test is also presented in Table 11-B to show that there is a trend for the drop of the Verbal Mean below the Vocabulary level to increase with progressive Schizophrenic deterioration.

---

[33] These considerations are valid only if the possibility of mental deficiency has been eliminated.

We have already stated that the horizontal axis in Figure 9 has a different meaning for the two graphlines represented on it: for one it represents the weighted score 12, which is the mean Vocabulary score of all the groups taken together; for the other it represents the Verbal Mean of each individual group. We shall now deal with the comparison of these two graphlines. If we consider the Psychotic Depressive group, and the two Chronic and two Deteriorated Schizophrenic groups, we will soon realize that the average weighted Vocabulary score in these groups is low, showing a drop below the 12 weighted score level; but that nevertheless these Vocabulary levels are still higher than the means of the Verbal scores of these groups. That is, the rest of the Verbal scores are even lower than the Vocabulary.

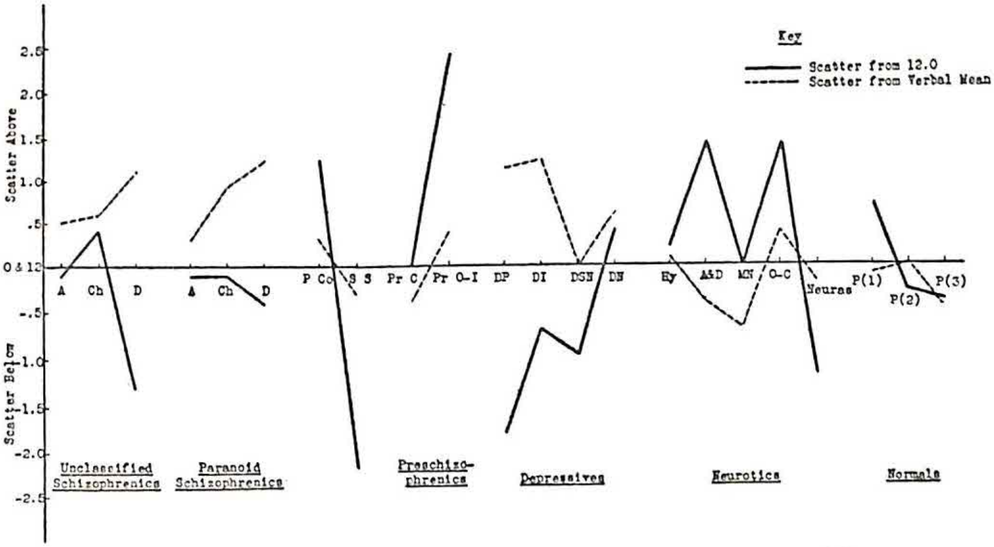


FIG. 9.—AVERAGE SCATTER OF VOCABULARY FROM THE VERBAL MEAN OF EACH GROUP AND FROM THE AVERAGE VOCABULARY (12.0) OF OUR POPULATION

---

[34] The horizontal axis in this graph has a different meaning for the other graphline; for the other it represents the average Vocabulary score of 12 for our entire population.

[35] The only group in which the Vocabulary score is clearly lower than the Verbal Mean is in the Mixed Neurotics. According to the table of significance, this is a trend significant on the 5–10 per cent level. The reason for this trend is not clearly discernible to us; we have not found it specifically significant in the course of our clinical work.

In other words, schizophrenic chronicity and deterioration, as well as acute psychotic depression, may encroach upon Vocabulary; but Vocabulary is still more resistant to this influence than are the rest of the Verbal subtests.[36]

The Simple Schizophrenias and the Neurasthenias tend to have a very low weighted score on Vocabulary; but it is nevertheless only slightly—and, statistically, not significantly—below their Mean Verbal score. That is to say, the Verbal level of these groups is also lowered. The Paranoid Conditions, the Over-Ideational Preschizophrenics, and the Obsessive-Compulsives have a high average weighted score on Vocabulary; but they are not as much above their Verbal Mean level as they are above the level of the 12 weighted score, the Vocabulary average of the entire population. The reason is that their other Verbal scores remain high. These are the three groups which characteristically emphasize intellectual functioning.

TABLE 11-A.—MODIFIED MEAN SCATTER OF VOCABULARY. *Percentage of Cases in Ranges of Scatter*

Group	N	Percentages		
		> +1	+1 to −1	< −1
U Sch + P Sch	63	35	55	10
DP + DI	15	53	47	—
DSN + DN	16	6	82	12
Neurotics	59	12	76	11
Patrol	54	11	78	11
P Co + Pr OI	29	28	58	14

TABLE 11-B.—*Differential Significance of Distributions*

Groups Compared	Chi^2(d.f. = 2)	Significance
(P + U) Sch A : (P + U) Sch D	2.77	10%
(P + U) Sch : (DP + DI)	1.04	30%
(P + U) Sch : Neurotics	7.70	<1%
(P + U) Sch : Patrol	7.79	<1%
(DP + DI) : (DSN + DN)	6.20	1–2%
(DP + DI) : Neurotics	10.29	<<1%
(DP + DI) : Patrol	10.46	<<1%

Special Chi^2(d.f. = 4)	Chi^2(d.f. = 4)	Significance
(P + U) Sch A : (P + U) Sch Ch : (P + U) Sch D	4.10	10–20%

---

[36] This restates, from a different point of view, the findings discussed in connection with V′ scatter in the section on Vocabulary Scatter.

Figure 10 represents another approach for testing the deviation of Vocabulary from the Verbal Mean. It presents the percentage of cases in each group falling into one of three categories: those whose Vocabulary level is more than one weighted-score unit above the Verbal Mean; those whose Vocabulary level is more than one unit below the Verbal Mean; and those in between. The graph shows with relative clarity that the *middle* group increases as we go from the Schizophrenic end of the graph to the Normal end, indicating a greater harmony of efficiency of verbal functions in the normal range. The graph also shows that the number of cases having a Vocabulary score *above* the Verbal Mean is marked in the Depressive Psychosis groups and in the two major Schizophrenic groups, while it is minimal or absent in the Neurotic and Normal groups. Those cases who have a Vocabulary score more than 1 *below* the Verbal Mean are almost absent in the Depressive groups; they are represented to a certain extent in the two major Schizophrenic groups; and they are represented to the greatest extent in the Neurotics and Normals. In other words, the percentage distribution of cases supports the conclusions drawn from the distribution of the means as shown on Figure 9. The major Schizophrenic groups and the Depressive Psychoses, which tend to have a general drop of the Verbal level, show up on Figure 10 with a considerable percentage of cases having Vocabulary scores more than 1 above the Verbal Mean. The Neurotic and Normal groups, which do not tend to have such a drop of the Verbal level, show up with an increased middle group—in other words, an increased percentage of cases which are less than or equal to 1 unit distance from the Verbal Mean—and with a considerable percentage of cases which are more than 1 below the Verbal Mean. The Chi^2's of Table 11-B indicate that differences shown on the graph are statistically significant.

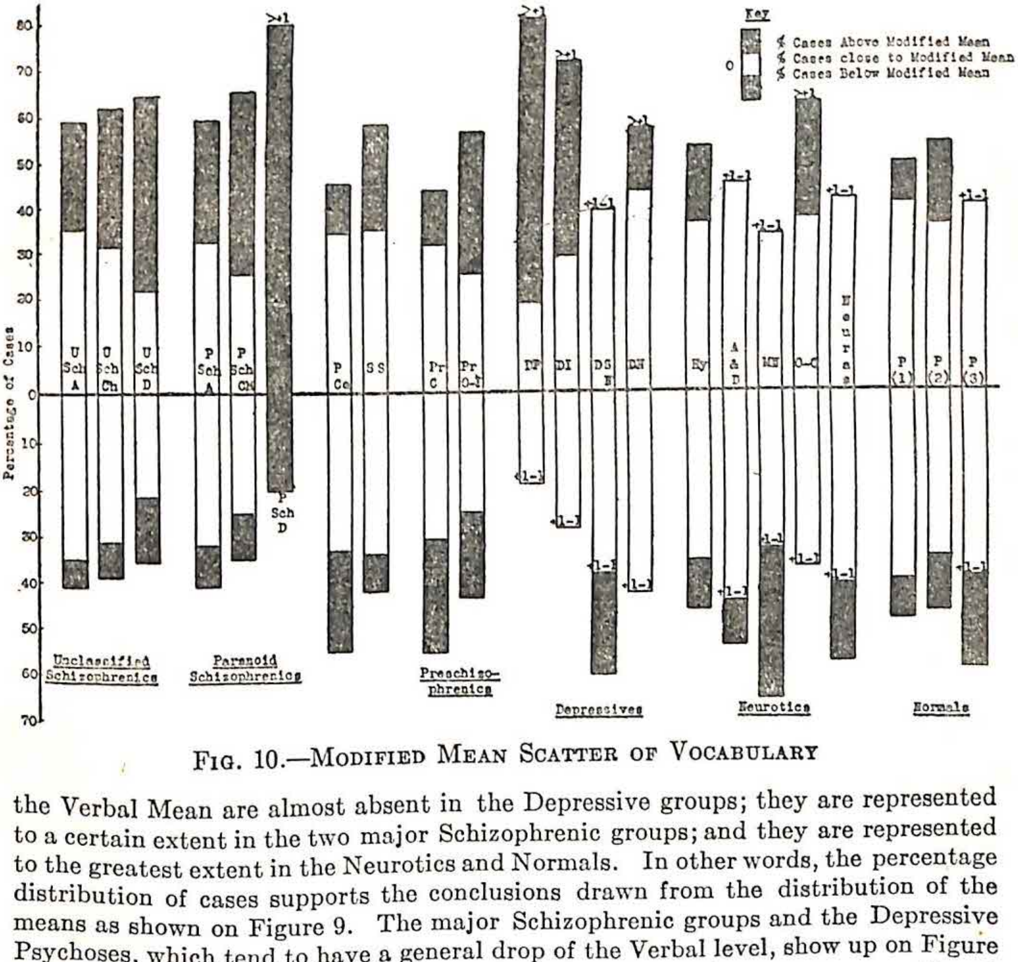


Fig. 10.—Modified Mean Scatter of Vocabulary

We conclude that a parallel lowering of both the Verbal Mean and the Vocabulary score is most indicative of a Simple Schizophrenia or a Neurasthenic type of neurosis. A lowering of the Vocabulary score accompanied by an even greater lowering of the Verbal Mean is most indicative of a Depressive Psychosis or a deteriorative Schizophrenia. A Vocabulary score higher than a well-retained Verbal Mean—in a case of maladjustment—is most indicative of one of the three "intellectualizing" groups (Paranoid Condition, Over-Ideational Preschizophrenia, and Obsessive-Compulsive Neurosis).

Here again the indicator is not in itself diagnostic; it is merely an additional diagnostic guide which can be used in conjunction with all other features of the Vocabulary subtest, with all other features of the other subtests of the Bellevue Scale, and with all other indications of the other tests.

7. Analysis of the Extreme Weighted Scores of the Vocabulary Subtest. An added appraisal will be given here as to the distribution of the Vocabulary scores. This will be done in reference to Special Figure 3 (page 86), presenting the distribution of extremely high weighted scores, and to Special Figure 2 (page 85), presenting the distribution of extremely low weighted scores. The graph presenting in bar-graph form the high weighted scores includes all the weighted scores equal to or higher than 15; the graph presenting the distribution of extremely low weighted scores presents the scores equal to or less than 5. On these graphs the number of cases in each bar may be read from the vertical axis. Special Figure 2 readily shows that Vocabulary is the subtest which has the least number of cases having low weighted scores; only one case, an Involutional Depression, has a Vocabulary score in the extreme low range. Further evidence for its stability is that there is only one case, belonging to the Simple Schizophrenic group, which has a weighted score on Vocabulary of 6; there are only three cases with a weighted score of 7, all three belonging to the Unclassified Schizophrenic group; there are only nine cases which have a Vocabulary score of 8, two of which belong to the Simple Schizophrenic and two to the Psychotic Depressive group. The rest of the distribution is indicated in Table 10 where the limit for low scores is *less than or equal to* 10.

Special Figure 3 presents the summary of all the high weighted scores, and indicates that Vocabulary, which is superior to Similarities and Information in resisting impairment, has fewer high weighted scores. It is probable that this also bespeaks the stability of the test. Whether or not it can be considered further evidence of the refractory nature of vocabulary to later life experience and scholastic attainment cannot be decided. If it is, then the low share the patrol has in high weighted scores becomes understandable.

Tables 12 present the frequencies, and the significance of the differences between the frequencies, of the high Vocabulary scores obtained by the various groups. It shows that the Over-Ideational Preschizophrenics, the Obsessive-Compulsives, and the Paranoid Conditions are the only 3 groups to have more than half of their cases in the range of high weighted scores. These 3 groups, constituting about 20% of the entire population, contribute about 50% of the cases having a Vocabulary score *greater than or equal to* 15. This is further demonstration of the point that these cases are a type who "intellectualize" and retain their intellectual achievements to a

TABLE 12-A.—*Frequency of High Weighted Scores on Vocabulary (14, 15, 16, 17)*

Group	14	15	16	17	Total	% of Group
U Sch A	4	2	—	—	6	35
U Sch Ch	2	1	2	—	5	38
U Sch D	2	—	—	—	2	29
P Sch A	1	—	1	—	2	18
P Sch Ch	1	—	—	—	1	10
P Sch D	—	—	1	—	1	20
P Co	4	2	1	—	7	54
SS	2	—	—	—	2	22
Pr C	4	1	—	—	5	31
Pr OI	7	4	1	1	13	81
DP	—	—	—	—	0	0
DI	—	2	—	—	2	29
DSN	1	1	—	—	2	22
DN	3	—	—	—	3	43
Hy	4	1	—	—	5	28
A & D	3	—	1	—	4	40
MN	2	—	—	—	2	22
O-C	4	3	2	—	9	56
Neuras	—	—	—	—	0	0
Patrol (1)	9	3	—	—	12	38
Patrol (2)	4	—	—	—	4	24
Patrol (3)	—	—	—	—	0	0
Special Groups:						
U Sch					13	35
P Sch					4	15
P Co + Pr OI					20	69
DP + DI					2	13
DSN + DN					5	31
Hy + MN					7	26
Total Patrol					16	30

great degree even in maladjustment. On the other hand, the Hysterics and hysteric-like Mixed Neurotics together contribute only 1 case with Vocabulary *greater than or equal to* 15. These groups, representing 10% of the population, contribute only 3% of the high cases. The "repressive" character of these groups has already been described. The clinical contrast between them and the "intellectualizing" groups here becomes evident in the test results.

The statistical table shows that the difference in the incidence of high scores between the combined Paranoid Condition and Over-Ideational Preschizophrenic group, and either of the major Schizophrenic groups, is statistically significant. There is no significant difference between either of the major Schizophrenic groups and the Patrol, a fact which is probably referable to the cultural difference—the Schizophrenics having by reason of their illness lost some of these high scores, the patrol never having been within reach of them. The Psychotic Depressives have not one case in the high range. The other Depressive groups are on about the same level as the Normals and Schizophrenics.

We conclude that the investigation of the extreme weighted scores, at the low and the high ends of the score continuum, indicates again the tendency of Obsessive-Compulsives, Over-Ideational Preschizophrenics, and Paranoid Conditions to have a very high Vocabulary score, and reinforces the contention that in general vocabulary is very stable. The cultural differences are again, in this analysis, thrown into relief.

TABLE 12-B.—*Differential Significance of Frequency of High Weighted Scores*

Groups Compared	Chi^2(d.f. = 1)	Significance
P Sch : U Sch	2.10	10–20%
U Sch : Patrol	not tested—%'s too close	
U Sch : (P Co + Pr OI)	6.15	1–2%
P Sch : Patrol	1.22	20–30%
P Sch : (P Co + Pr OI)	13.90	<<1%
(DP + DI) : (DSN + DN)	.58	30–50%
(DP + DI) : U Sch	1.52	20–30%
(DP + DI) : Patrol	.88	30–50%
O-C : (Hy + MN)	2.76	10%
O-C : Patrol	2.74	10%

8. General Diagnostic Conclusions.

(a) Many misses on relatively easy Vocabulary items, especially if harder items are passed, are characteristic of Psychotic Depressives, Schizophrenics, and Neurasthenics. To a lesser extent, they are characteristic of precariously-adjusted Normals with a poor cultural background.

(b) Relatively low weighted scores are characteristic of Psychotic and Severe Neurotic Depressives, Simple and Deteriorated Schizophrenics, Neurasthenics, and precariously-adjusted normals with a poor cultural background.

(c) High weighted scores are most characteristic for those groups given to "intellectualization" or "compulsive" defense mechanisms—

namely, Over-Ideational Preschizophrenics, Paranoid Conditions, Obsessive-Compulsive Neuroses, and the Anxiety and Depression group. These groups consistently have the least amount of misses on all levels of difficulty of the Vocabulary test. Low weighted scores are extremely rare for these groups.

(d) A parallel lowering of both the mean of the Verbal subtest scores (excluding Digit Span and Arithmetic) and the Vocabulary score is characteristic of Simple Schizophrenics and Neurasthenics. A lowering of the Vocabulary score, accompanied by an even greater lowering of the Verbal Mean, is characteristic of Psychotic Depressives and deteriorative Schizophrenics.

F. COMPREHENSION

1. Introduction. In this section we shall deal with the evaluation of the *Comprehension* subtest of the Bellevue Scale. It would perhaps be more systematic to deal with the subtests in a sequence of their increasing vulnerability (Vocabulary, Information, Similarities, and Comprehension); but partly the sequence followed by Wechsler, and partly the diagnostic significance of Comprehension, incline us to follow Vocabulary with Comprehension.

This subtest consists of ten items.[37] According to the scoring instructions given in the manual of the Bellevue Scale, a complete response to each item is credited with a score of 2, an incomplete response with a score of 1, and a failed response with a score of 0. The sum of the scores thus obtained is translated into a weighted score. These weighted scores are those entered in our scattergrams and used to obtain scatter measures. In that part of our discussion which will be devoted to the items of the subtest and to their qualitative analysis, scores referred to will be the raw scores; while in that part of the discussion devoted to scatter, scores referred to will be weighted scores. The Comprehension subtest will be dealt with in the following as one of the four essentially Verbal subtests, the others being Information, Similarities, and Vocabulary.

Special Table 3 indicates that for our total population Comprehension has the lowest mean of all the subtests of this Verbal group. If its standard deviation is relatively small, this may be due to the fact that it is generally more vulnerable to maladjustment than the other Verbal subtests; the drop in score is rather consistently present throughout the groups. The plan of our discussion is again to offer first some theoretical considerations concerning the psychological nature of the subtest and the functions underlying achievement on it. These considerations will continue into the next section, which gives an item-analysis of the subtest's 10 items. This in turn will be followed by a discussion of the different scatter measures as applied to this subtest, showing the relationship of the achievements on this subtest to those on other subtests.

---

[37] 1. What is the thing to do if you find an envelope in the street, that is sealed and addressed and has a new stamp? 2. What should you do if while sitting in the movies (theatre) you were the first person to discover a fire (or see smoke and fire)? 3. Why should we keep away from bad company? 4. Why should people pay taxes? 5. Why are shoes made of leather? 6. Why does land in the city cost more than land in the country? 7. If you were lost in a forest (woods) in the daytime, how would you go about finding your way out? 8. Why are laws necessary? 9. Why does the state require people to get a license in order to be married? 10. Why are people who are born deaf usually unable to talk?

The reader may find that in the following pages we appear to devote too much space to considerations which lie rather far from our practical topic. Our only justification is in our attempt to bring the test material into some direct relationship to the everyday psychological functioning of human beings. The relationships we shall point out are based on our experience, and may be questionable; it is hoped, however, that they will interest psychologists in pursuing such considerations further, and will contribute to making intelligence tests not merely a gauge of I.Q., but an experimental tool in the understanding of the everyday functioning and thought processes of human beings. Specifically in connection with the Comprehension subtest we wish to reemphasize this. Psychology of thinking as known to us today is a psychology of "logical thinking" or, at its best, a psychology of "concept formation"; both of these are only parts, though very important, of the psychology of everyday thinking, and do not explain the functions underlying Comprehension. It is our hope that the considerations advanced here will contribute specifically to the understanding of Comprehension, and in general will serve as a rationale to the diagnostic use of intelligence tests. Otherwise, even should we contribute a series of observations, statistically substantiated, showing that certain drops and certain rises of the scores are related to certain disturbances, we will not have departed from the mechanical use of the intelligence test for gauging I.Q. Before the test can be used as a truly diagnostic tool, some rationale of its items is necessary. The rationale advanced at this stage of our knowledge may be incorrect; but pointing out of the necessity of such a rationale cannot be incorrect. The major patterns of scatter discussed in the introduction to this chapter demonstrate that there is a system in scattering. The exploration of this system, like every exploration, has as a prerequisite certain hypotheses. These hypotheses may have to be replaced later, but without initial hypotheses the examiner will not be able to organize his findings around a systematic line of thought. Further observations may in turn substantiate or repudiate these hypotheses, leading to new and better ones.

2. The Psychological Rationale of the Comprehension Subtest. It will be maintained in the following that the function underlying the Comprehension subtest is related to the function of "judgment". The concept of judgment is one which is frequently used in psychiatric phraseology in the form, "judgment is impaired"; this is especially the case in connection with senile, paretic, and other non-spectacular syndromes of organic etiology—in other words, where the psychiatric syndrome is characterized not by obvious and tangible symptoms but rather by an inadequacy of functioning little noticed by the subject himself, although it seriously encroaches upon his everyday existence. In the middle field of functional psychoses and of neuroses, the concept of judgment is not so generally applied, but is frequently replaced by the term "reality testing"—in other words, appropriate understanding of and reaction to reality. The concept of judgment is used also as a commonsense concept in characterizing a fellow human as "a man of unusually good judgment." In such statements we refer neither merely to his intellectual attainments, nor merely to his emotional qualities as revealed in his interpersonal relationships.

It appears that the concept "judgment" is one of those many concepts which are used without their having attained a sufficient conceptual clarification. "Judgment" evidently refers to a function on the borderline of intellectual and emotional functions. Though we should be inclined to state flatly that there are no emotional functions without intellectual components, and vice versa, there are some functions which we are accustomed to label as intellectual, inasmuch as they come to consciousness more in intellectual terms; and others which we label as emotional, inasmuch as they come to consciousness more in emotional terms. "Judgment" appears to refer to the emotionally relevant use of one's *assets* in regard to the reality situation, where though intellectual and logical correctness are implied, they play a rather subordinate rôle. The terms "proper" and "appropriate" are other terms commonly used to indicate actions brought about by good judgment.

One might argue that good judgment is the outcome of infallibly logical thinking and conduct. It is difficult to refute such an argument. One can only reply that a conscious logical process which would prepare an action of good judgment would have to consider such an infinite multiplicity of facts and conditions pertaining to the situation that the temporal factor alone would make it impossible. Rather, the case would appear to be one in which a proper emotional orientation brings to consciousness and to execution, out of the multiplicity of logical possibilities, that action which is labeled as one of 'good judgment". The clinical psychologist accustomed to considerations of "Gestalt" psychology will be at an advantage—especially when not bound by the intellectualistic terms of that school—in evaluating these problems. Not infrequently persons say, "If I had just had a little more time to think it over, I would never have done that." Life, however, does not always give time allowances, and neither do psychological tests; persons of good judgment act immediately—or refrain from action—according to their own unwritten code of conduct, which is primarily emotional in nature. It is true that in some persons, especially when highly intelligent and compulsive, sharpness of logic may partially replace sound judgment: but in few cases is this successful; the majority become doubt-ridden, see too many possibilities, and the choice is very difficult for them. Good judgment is rather the efficient utilization of knowledge in a manner tuned to the whole situation.

Inasmuch as the concept of "judgment" is still undefined, we shall not attempt here to prove that the Comprehension subtest items "measure" it. We claim only that it is useful to think of the Comprehension subtest in the way we think of judgment. The Comprehension items, like situations requiring judgment, demand more than possession and activation of information: they demand meaningful and emotionally relevant activation, selection, and organization of those facts and relationships known to the subject. They demand also a delaying of first impulses. In the question, "What should you do if, while sitting in the movies, you were the first person to discover a fire?" the impulsive response, "Holler fire!" must be suppressed if a "good response" is to be achieved. Many self-controlling impulsive people will begin, "I won't holler fire, but rather . . ."; others, who are less contained, will say: "I know one shouldn't holler fire but I am afraid that's what I'd do. . . ." The Comprehension items, like situations calling for judgment, also require more than merely a delay of impulse and enumeration of possibilities. In the question, "Why does the state require people to get a license in order to be married?" references to license revenue, legality of children, health examination, age requirements, prevention of venereal disease, do not improve the response; they rather call for an appropriate selection.

The information possessed and the relationships known must be so structured as to meet the questions' requirements. This is thus a complex function, which can be expected to be neither so refractory to impairment as Vocabulary nor so highly developed as Vocabulary in the "intellectualizing" clinical groups. As a matter of fact, the defense of "intellectualization" may be considered to have been developed to replace judgment because of the presence of doubt.

The vulnerability of the Comprehension subtests to impairment can be readily understood from another point of view. While in an Information problem the answer is known or not known, in a Comprehension question the information and knowledge activated—brought into consciousness—by the question are multiple, if not infinite. Thus, it is not merely the grasp *of information and knowledge, but also the proper selection and emphasis* of it which can become impaired. Information can be learned and retained; but balance of the varied factors that go into good comprehension and judgment can be acquired progressively only by prototype and experience, and cannot be taught. The relationships of information, knowledge and comprehension here discussed have played a considerable rôle in giving many an educator a feeling of the futility of all education.[38]

These discussions, however, may give a distorted view of the relationship of the Comprehension subtest to the function of judgment. To obtain a more adequate view of this relationship, it should be remembered that good judgment, once developed, may achieve a stereotyped verbal form which will survive long after the function has been distorted and rendered ineffective by maladjustment. In these cases, passing Comprehension responses are empty skins of a once live function of judgment. Such cases are quite frequent, especially in chronic schizophrenic conditions which are characterized clinically as "able to put up a good front". To the development of such an apparent good front, commonplace stereotypes which society creates for itself contribute more than is obvious. A very characteristic stereotype of the contemporary American scene is the response to the question, "Why should people pay taxes?"—"To support the government". Another factor which frequently contributes to the maintenance of good front is a strict moralistic education, which communicates as dogmatic information what otherwise would be a result of judgment; thus the individual's attitude towards judgments renders them objective laws which become unchangeable. This is not infrequently the effect of conservative Catholic education. Poor judgment will be manifested by such cases in their inflexibility.

In the following we shall attempt to show, by statistical and graphical means, in which groups judgment is impaired and in which groups it is well-retained. It is not enough, however, to estimate only quantitative trends. Much can be learned about the patient by a qualitative analysis of the answers, especially of the unscored aspects of them.

The examiner will segregate in his thinking those persons who answer the questions squarely, and those who mass a great variety of possibilities. The former, whether of poor or good judgment, will differ by their decisiveness from the latter, who see too many possibilities and cannot make up their minds. The examiner will segregate those who, without hesitancy, reply, "I would yell 'fire'," and those who say, "I certainly should not yell 'fire', I hope I would not yell 'fire'; I don't know what I would do; I know I shouldn't yell 'fire', but I am not certain that I wouldn't." The former probably will be the impulse-ridden persons; the latter, persons whose "better judgment" is in constant struggle with their impulses.

---

[38] It is worthwhile in this connection to remember the Socratic discussions with Sophists on the "teachability of virtue".

The examiner will segregate those persons who "keep away from bad company because it is bad influence"; those who do not want to keep away from bad company because they are not so weak as to yield to bad influence, or because one can have fun with or "learn a lot" from them; and those who consider bad company as uninteresting or uninspiring. In making such a segregation, he will again differentiate between persons of judgment, persons of sophistication of a kind which encroaches upon judgment, and persons in whose set judgment the vestiges of a moral code are effective.

3. Administration. It is not our intention to duplicate here either the administration or scoring instructions of the Bellevue Manual. Only features of administration and scoring not touched upon by Wechsler will be taken up here.

We have already stated that the responses to Comprehension questions may be merely verbal stereotypes, instead of expressions of good judgment. This obliges the examiner to watch every response carefully; and wherever a peculiar verbalization occurs, or the structure of the response is unusual, he should inquire into what the subject meant, in order to discover whether an utterly inadequate judgment hides behind a well-sounding stereotype. Thus, one schizophrenic responded to the question on movie-fire as follows: "I'd shout out fire and then notify the management." This might have been considered a mixture of good judgment and impulsivity. The inquiry, however, gave evidence in another direction: the patient said, "I'd notify the management so that the ushers could tell it to those who didn't hear me."

Wherever a response is failed in a not too usual manner, inquiry is also in place for two reasons: first, it will yield material on the basis of which the degree of distortion of judgment (neurotic-psychotic) can be estimated; and second, it will familiarize the tester with the thought processes of the maladjusted person. Only the accumulation of such material will lead to a psychology of thinking which will be more than an investigation of logical thinking. To our regret the material necessary for systematization of such findings must be much more extensive than that at our disposal.

It is important with every subtest to take verbatim notes of the subject's verbalization; and particularly this is so in regard to Comprehension. Without full notes, a restudy and qualitative evaluation is impossible.

Concerning scoring, our experience shows that no amount of scoring samples and instructions will embrace the enormous variability of responses. It will be necessary for the tester to hold his own council. We proceeded by equalizing scores; that is, if three responses each barely sufficed for a score of two, we gave two of them this score and the weakest of the three a score of one. We used this principle generally. Nonsensical response features were sufficient for us to score as zero a response which otherwise would have passed. If inquiry into a passing initial response went beyond what the Bellevue Manual prescribes, it never affected the scoring.

4. Item Analysis of the Comprehension Subtest. We divided the Comprehension items into two groups.[39] The statistical basis of this division will be discussed later.

The first group contains questions which presuppose not an extensive education, but an unhampered receptivity for everyday experiences; the second group implies some breadth of information and appreciation of relationships. In the first group of items—which may be referred to as "easy items"—there are two which, at first glance, do not seem to fit the characteristics of this group. These are: "Why are laws necessary?" and "Why should people pay taxes?" These questions appear to be more abstract and complicated than the rest, and do not refer as directly to practical life experiences. Nevertheless, a survey of the answers indicates that the average, normal American has a "pat" answer to these questions. Moreover, these stereotyped answers are apparently as much a matter of commonplace information as any direct life experience is.

In the second group of questions, there is one which deviates—contrary to the expectancy of the present authors—from the character of the others. Only because it belongs statistically with the other three questions is it grouped here. This is the question, "What should you do if while sitting in the movies you were the first person to discover a fire?" Even our Patrolmen, who are supposed to know what to do in such a situation, frequently missed this item. The explanation for the Patrolmen is twofold: first, we had a considerable number of *impulsive* Patrolmen, some of whom thought of shouting "fire"; second, and more important, the code of Patrolmen in such a situation is apparently different from that of the average population. The Patrolman as a safety official is supposed to assume personal responsibility and try to keep the public quiet; and apparently many of them interpreted the question as a test of their knowing their job, rather than as a general inquiry. Such responses do not, according to the Bellevue standards, merit a passing score. Thus, although we placed this item with the difficult ones, it seems quite probable to us that a check with a population other than policemen, firemen, and so on, would change the placement of this item.

---

[39] I. (1) What is the thing to do if you find an envelope on the street, that is sealed and addressed and has a new stamp? (3) Why should we keep away from bad company? (4) Why should people pay taxes? (5) Why are shoes made of leather? (7) If you were lost in a forest (woods) in the daytime, how would you go about finding your way out? (8) Why are laws necessary?

II. (2) What should you do if while sitting in the movies you were the first person to discover a fire? (6) Why does land in the city cost more than land in the country? (9) Why does the state require people to get a license in order to be married? (10) Why are people who are born deaf usually unable to talk?

While failure on the easy items indicates generally an impairment of judgment, and with it an impairment of functioning in general, failure on the difficult items may or may not indicate an impaired judgment; lack of information and of general awareness of the relationships implied by the questions may in itself be the basis of failure. The consideration of the quality of the responses helped us to distinguish essential failure from "temporary inefficiency"; but in an effort to establish the validity of the dichotomy of the Comprehension items given above, we used the criterion of full failure.

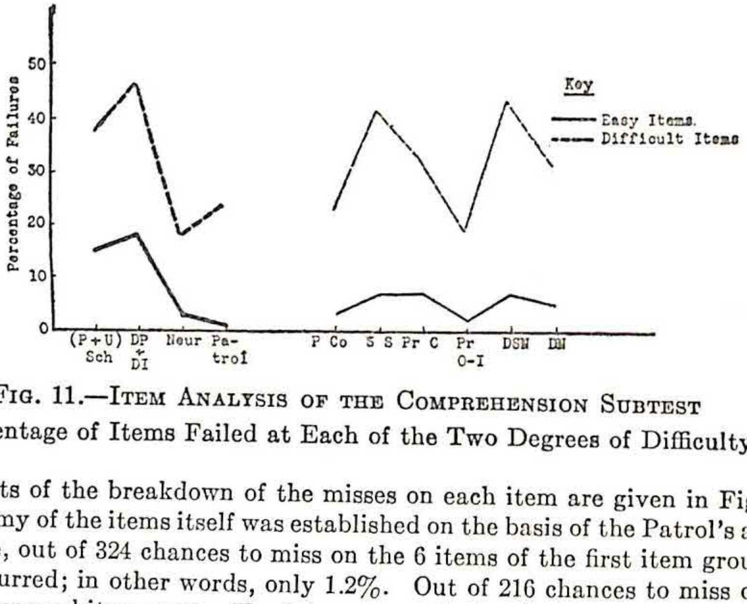


FIG. 11.—ITEM ANALYSIS OF THE COMPREHENSION SUBTEST
Percentage of Items Failed at Each of the Two Degrees of Difficulty

The results of the breakdown of the misses on each item are given in Figure 11. The dichotomy of the items itself was established on the basis of the Patrol's achievement. Here, out of 324 chances to miss on the 6 items of the first item group, only 4 misses occurred; in other words, only 1.2%. Out of 216 chances to miss on the 4 items of the second item group, 53 misses occurred; that is, 24%. The graph shows that all the Neurotic and Psychotic groups have a higher percentage of misses on the easy items than the Patrol. No such significant differences can be found on the difficult item group. Table 13 shows the differential significance of the amount of misses in the different clinical and control categories; Table 14 presents this in terms of the percentage of cases having such misses. The direction, quantity, and significance of the distribution of *misses* and *cases missing* are uniform, and the results can be discussed without distinguishing between the two measures. Figure 11 indicates that the greatest incidence of misses on the easy items occurs in the Schizophrenics and Depressive Psychoses; and Table 13 shows that these two groups are statistically significantly differentiated from all other groups. The Simple Schizophrenics, the Coarctated Preschizophrenics, and the Severe Neurotic Depressives have significantly more misses than do the Normals, but have far fewer misses than the combined Schizophrenic and the Depressive Psychotic groups. The Neurotic Depressives, the Neurotics, the Over-Ideational Preschizophrenics and the Paranoid Conditions have only slightly more misses than do the Normals, and are not statistically distinguishable from them. This slight difference may be attributed to the greater incidence of temporary inefficiency in these groups, a result which conforms to clinical-theoretical expectations. The Paranoid Conditions and Over-Ideational Preschizophrenics are characterized by a formal intellectualization which is for all practical purposes unimpaired, though their life activities may be extremely encroached upon. That they are able to put up a "good front" clinically is paralleled by their relatively normal performance on the Comprehension subtest. The tables indicate that, in general, one out of every two or three Schizophrenics and Depressive Psychotics may be expected to miss at least one easy item. Only one out of ten or fifteen Normals is likely to do so.

TABLE 13-A.—*Percentage of Misses on Easy Comprehension Items*

Items 1, 3, 4, 5, 7, 8

Group	No. of Cases	No. of Chances	No. of Misses	% Missed
U Sch + P Sch	63	378	56	14.8
P Co	13	78	2	2.6
S S	9	54	4	7.4
Pr C	16	96	6	6.2
Pr OI	16	96	2	2.1
DP + DI	15	90	16	17.8
DSN	9	54	4	7.4
DN	7	42	2	4.8
Total Neurotics	59	354	10	2.8
Total Patrol	54	324	4	1.2

TABLE 13-B.—*Differential Significance of Frequency of Misses on Easy Items*

Groups Compared	Chi^2(d.f. = 1)	Significance
(P + U) Sch : (DP + DI)	.29	50–70%
(P + U) Sch : Neurotics	30.6	<<<1%
(P + U) Sch : Patrol	39.4	<<<1%
(DP + DI) : Neurotics	26.4	<<<1%
(DP + DI) : Patrol	38.4	<<<1%
Patrol : SS	5.79	1–2%
Patrol : Pr C	6.0	1–2%
Patrol : DSN	5.79	1–2%
Patrol : DN	1.10	20–30%
Patrol : Neurotics	1.4	20–30%

We conclude that a complete miss on one of the easy items is most characteristic for Schizophrenics and Depressive Psychotics. Such complete failures are very rare in Neurotics and Normals, but may sometimes occur as a result of "temporary inefficiency". Here again it should be emphasized that one cannot rely on a single indication, whether in the item breakdown, such as that given here, or in analysis of a full subtest score, such as will be given soon; but the piling up of evidence in the eyes of the careful examiner will indicate in a great percentage of cases—even on the Bellevue Scale alone—the lines on which the diagnosis must be drawn.

TABLE 14-A.—*Percentage of Cases with One or More Misses on Easy Items*

Group	No. of Cases	% who Missed	Group	No. of Cases	% who Missed
U Sch A	17	29	DP	8	62
U Sch Ch	13	54	DI	7	57
U Sch D	7	100	DSN	9	44
			DN	7	29
P Sch A	11	45			
P Sch Ch	10	60	Hy	18	17
P Sch D	5	40	A & D	10	0
			MN	9	11
P Co	13	15	O-C	16	38
S S	9	44	Neuras	6	17
Pr C	16	31	Patrol (1)	32	9
Pr OI	16	6	Patrol (2)	17	0
			Patrol (3)	5	20

TABLE 14-B.—*Differential Significance of Percentages of Cases*

Groups Compared	Chi^2(d.f. = 1)	Significance
(P + U) Sch : (Neurotics—O-C)	15.57	<<<1%
(P + U) Sch : Patrol	23.70	<<<1%
S S : (Neurotics—O-C)	3.54	5–10%
S S : Patrol	6.50	1–2%
Pr C : (Neurotics—O-C)	1.95	10–20%
Pr C : Patrol	4.32	2–5%
Total Depr. : (Neurotics—O-C)	10.55	<<1%
Total Depr. : Patrol	16.77	<<<1%
O-C : (Neurotics—O-C)	3.58	5–10%
O-C : Patrol	6.84	<1%

The first group of six questions—even by the mere form of presentation in several items, "What should you do?"—makes the judgmental character of the Comprehension subtest and its reference to life situations reasonably clear. Failure on one or several of these six questions must—in terms both of the nature of the questions and of the statistical results—be considered an indication of impaired judgment. Whether this impairment is a general one, or one to be referred to as "temporary inefficiency"—as in those occurring in the Patrol—is a matter that must be decided by the examiner in each case, considering the quality of the failure, the total number of items failed in this group, and the quality of the responses to the other group. Thus, bizarre verbalizations and judgments on any of the Comprehension items will indicate that the failure is probably not one of "temporary inefficiency", but is to be viewed as pathological in the sense indicated by the statistical appraisal given above. Differentiation from low level of intelligence or feeble-mindedness is achieved by the observation that subjects who fail on one or several of the six easy items, and pass any of the more difficult items, are most likely not feeble-minded. Figure 11 makes it obvious that neither the Schizophrenics nor the Depressives tend to fail all the difficult items. It is true that the number of failures on the second group is much greater than on the first; nevertheless it is still far from one hundred per cent, while in the low intelligence levels it will either approach or reach the hundred per cent mark. A tabulation of the Schizophrenic and the Depressive cases which have failures on the six easy items shows that on the whole they obtain full scores on some of the four more difficult items. The percentage of cases in which this occurs is:

U Sch A	80%	S S	50%
U Sch Ch	71%	Pr C	80%
U Sch D	43%		
		DP	40%
P Sch A	60%	DI	75%
P Sch Ch	67%	DSN	75%
P Sch D	50%	DN	50%

In other words, passing difficult and failing easy items is one of the important diagnostic bearings on the Comprehension subtest.

Failures on the second group of four questions, as stated above, does not necessarily imply impairment of judgment; persons coming from certain educational and social settings may be prevented by limited knowledge from adequately answering some of these questions. But a majority of zero scores even on these questions should raise the possibility of the presence of impaired judgment. In order to evaluate failures on this second part, one will usually turn to the total score on the Comprehension group, and compare it with other scores such as the Vocabulary or the Information scores, or the mean of the Verbal subtest scores.

5. Comprehension and Information. In introducing the concept of scatter, and in the discussion of Major Scatter-Patterns, we indicated that in addition to the scatters of the individual subtests we would discuss those relationships between certain subtests which appear to have special significance. The outstanding relationship of the Comprehension subtest is to the Information subtest. The first reason for discussing this relationship is found in our discussion of the psychology of "judgment". There we pointed out the relationship of information and judgment; it would follow from this that intelligence is harmoniously structured if information and its appropriate application in reality—that is to say, judgment—are equally well developed. The second reason for discussing this relationship is that Comprehension and Information are usually the first two subtests given; thus the understanding of their relationship gives the examiner a direction of expectancy for the rest of the test. In this connection it is important to note that Information is about as stable as Vocabulary, as shown in Special Table 3; and where Vocabulary suffers under maladjustment—as in Simple Schizophrenia—Information may stand up. Thus, before Vocabulary is administered, a scatter measure very similar to Vocabulary Scatter is obtainable from the Information-Comprehension comparison.

In order to have a proper perspective for the evaluation of the relationship of Comprehension and Information in our material, let us first inspect the relation of these two subtests in Wechsler's standardization population. The correlation coefficient[40] of these subtests is .668 to .705 for the standardization population, which is among the very highest correlations in Wechsler's tables. Furthermore, if we turn our attention to the mean scores of these two subtests in the different age groups of the standardization population—as represented below on Wechsler's Table 40—we also find a remarkable parallel between the two. Up to about 10 years of age, Comprehension scores are higher and Information lags somewhat; from 11 years on to 16–19 years, Information tends to be higher, though the two scores become progressively equalized; and a remarkable equality is achieved above that age. Thus, both the correlation coefficient and the score comparison lead us to expect that disparity of Information and Comprehension Scores will prove an indicator of pathology; and, specifically, that a greater lagging of Comprehension behind Information than is shown by the standardization population will be indicative of impaired judgment.

---

[40] See pages 215–216 in Wechsler (28).

*Wechsler's Table 40**

Age	Information Mean	Comprehension Mean	Age	Information Mean	Comprehension Mean
7	2.5	2.5	16	10.4	10.0
8	2.9	3.8	17–19	10.5	9.9
9	3.9	4.9	20–24	10.4	10.0
10	5.7	6.5	25–29	10.1	10.7
11	7.6	7.5	30–34	9.8	9.7
12	9.8	8.6	35–39	9.8	9.8
13	9.9	9.0	40–44	10.1	10.0
14	10.5	9.6	45–49	9.5	9.5
15	10.6	9.8			

* See page 214, Wechsler (28), Second Edition.

Graph (1) of Special Figure 1 represents the relationship of Comprehension and Information. Inasmuch as it plots the average Vocabulary Scatter of these two subtests for each clinical and control group, it also represents the relationship of the Vocabulary subtest to these two subtests.

The horizontal axis of the graph represents the Vocabulary level of each clinical and control group. The units of the vertical axis are weighted-score units. Points above the axis represent negative, and points below it positive, scatter.

Inspection of the graph shows that the Vocabulary Scatter—the drop below the Vocabulary level—of the Comprehension subtest is greater than that of the Information subtest. There is only one exception to this rule: the Involutional Depressives, whose memory function underlying Information apparently shows impairment.

In the Neurotic groups the three hysteric-like groups[41] show a drop of Information below Comprehension, while the two obsessive-like groups[42] show a drop of Comprehension below Information. A "*t*"-test of scatter between Comprehension and Information, comparing the three hysteric-like groups to the two obsessive-like groups, yielded a "*t*" of 2.05, which is significant from 2-5%.

Thus the Graph (1) of Special Figure 1 indicates that Comprehension—that is, judgment—is impaired in all psychoses, and drops below Vocabulary and even below Information, which tends to stand up. Furthermore, it indicates that obsessive-like groups tend to behave like psychotic groups in this relationship; while hysteric-like neuroses tend to have Information impaired, which presumably is referable to repression.

These conclusions are supported by Special Tables 1 and 2, which give the average Vocabulary Scatter and average Mean Scatter, as well as the significance of their difference from zero, for all our groups. The only group whose negative Mean Scatter on Information approaches significance is the Hysteric. Similar is the situation on Vocabulary Scatter of Information, where only the negative scatter of the Involutional Depressives is significant, and only that of the Hysterics and the Chronic Paranoid Schizophrenics approaches significance. On the other hand, no group has a significant positive Vocabulary or Mean Scatter of Comprehension, while groups with significant negative Comprehension scatter are abundant. Finally, while the Vocabulary Scatter of the Hysterics on Comprehension does not differ significantly from zero, their negative Information scatter shows a trend toward significance. The reverse is the case for the Obsessive-Compulsives, whose Vocabulary Scatter of Information is positive, though not significantly different from zero, while their negative Scatter of Comprehension approaches significance.

---

[41] Hysteria, Anxiety and Depression, and Mixed Neurosis. The mention here of the Anxiety and Depression group, since it has been considered by us an intellectualizing group, needs explanation. It is that intellectualizing group which displays conscious anxiety and the hysteroid mechanism of repression.

[42] Obsessive-Compulsive Neurosis and Neurasthenia.

We conclude that a great drop of the Comprehension score below the Information score raises the suspicion of psychosis, or of an obsessive-like neurosis. In psychoses, Information dropping below Comprehension is an Involutional or Chronic Paranoid indication; in neuroses, it is a hysteric-like indication referable to repression.

6. *The Vocabulary Scatter: "t"-Test.*

Let us now turn to the consideration of the Vocabulary Scatter of the Comprehension subtest. This scatter measure is obtained by subtracting the Vocabulary score from the Comprehension score. The difference will be negative for all cases having a Comprehension score lower than the Vocabulary. The justification of Vocabulary Scatter was discussed in the Introduction and Vocabulary Section. It was pointed out that the Simple Schizophrenic group is an exception to the stability of Vocabulary, and that there is a similar inclination in some of the Depressive groups and in the Neurasthenic group.

Graph (1) of Special Figure 1 represents the Vocabulary Scatter of the Comprehension scores. Even rough inspection shows that the greatest drop in Comprehension occurs in the Chronic and Deteriorated Unclassified Schizophrenics, and in the Depressive Psychoses and Neuroses. Lesser, but still great, is the drop in the Acute Unclassified Schizophrenics, all Paranoid Schizophrenics, the Paranoid Conditions, and the Over-Ideational Preschizophrenics. Of all the Neurotic and the Normal groups, a sizeable drop is shown only in the Obsessive-Compulsive group. Inspection of the significance of difference from zero of the scatter, shown in the Special Tables 1 and 2, reveals that Chronic Unclassified Schizophrenics have a Comprehension scatter which is statistically significant both from the Vocabulary and from the Mean levels. Similar is the case for the Paranoid Conditions, Neurotic Depressives, and Over-Ideational Preschizophrenics. In other words, in these groups Vocabulary and the average of the other subtests in the Verbal part are better retained than is Comprehension. In the Acute Unclassified Schizophrenics and Depressive Psychoses, the Vocabulary Scatter is significantly different from zero, but the Mean Scatter differs from zero only as a slight trend. That is to say, in these acute disturbances Vocabulary stands up well, while all the other subtests tend to drop; so the drop of Comprehension, compared with these other subtests, is no longer significant but is rather a trend. The reverse is the case for the Deteriorated Unclassified Schizophrenics, where the deviation of the Vocabulary Scatter from zero is merely a trend, while the deviation of the Mean Scatter from zero is more significant. The Severe Neurotic Depressives show up similarly. It is worthwhile to note, in this connection, that in the discussion of the variability of Vocabulary[43] it was pointed out that the

---

[43] See page 100.

Deteriorated Unclassified Schizophrenics and the Severe Neurotic Depressives do tend to have a low Vocabulary. This accounts for the lack of significant difference between the Vocabulary and Comprehension levels in these groups.

The Patrol in all its subdivisions tends to show a positive Comprehension scatter; thus, this is what we may expect of normals in general. Though the reliability of difference from zero is insufficient, we will expect normals' Comprehension to be about equal to their Vocabulary score, and perhaps slightly above it.

7. The Vocabulary Scatter: Chi^2 *Test.* Thus far we have proceeded in our discussion of the scatter of Comprehension in terms of averages. For clinical diagnostic purposes knowing the number of cases which have a pathologically great scatter is more valuable than knowing averages, which is important rather for the psychology and pathology of thinking.

Table 15 Part I gives the percentage of cases of the various groups having a Comprehension score 3 or more weighted-score units below the Vocabulary score. In this table, the two major Schizophrenic groups were combined with the Preschizophrenic groups, since the impairment of Comprehension appeared to be consistently great in all parts of the Schizophrenic continuum. The table indicates that the Schizophrenics and the Depressives have, in general, significantly more cases showing a gr at impairment of Comprehension than do the Neurotics and the Patrol. One mayeexpect to find an extreme impairment of Comprehension in about one out of every three Schizophrenics or Depressives, while such a finding may be expected in only about one out of ten Normals or Neurotics.

Table 15 Part II presents the frequency of occurrence of great positive Vocabulary Scatter of Comprehension. Here the Neurotics and the Patrol have the highest incidence; the Depressives have almost none, and the Unclassified Schizophrenics have actually none. It is again noteworthy that the Paranoid Schizophrenics have a relatively large share of such cases; this again re-affirms their characteristic retention of formal judgment. The Obsessive-Compulsives do not do as well as the other Neurotic groups in this respect. The fact that the Neurotics—excluding the Obsessive-Compulsives—exceed the Patrol by 10 per cent in cases having great positive scatter is attributable to the inferior cultural background of the Patrol, compared to that of our clinical groups.

We conclude from this table that great positive Comprehension scatter is not to be expected in Depressives or Unclassified Schizophrenics; it is most likely to occur in Neurotics and Normals, although it may occur in some Paranoid Schizophrenics also.

8. Modified Mean Scatter: Chi^2 *Test.* In discussing Vocabulary Scatter in the preceding section we referred to Special Table 2, which gives the significances of Mean Scatter averages. We attempted to parallel that table, based on the average tendency of the various groups, with an analysis of the percentage of cases falling into various ranges of scatter as measured from the Verbal Mean. For these percentages, however, we calculated the scatter in a somewhat different way: we used here what we have described as the Modified Mean Scatter, or the difference between the Com-

TABLE 15-A.—VOCABULARY SCATTER OF COMPREHENSION. *Percentage of Cases in Ranges of Scatter*

Part I

Negative Scatter ≦ −3

Group	No. of Cases	% ≦ −3
U Sch + P Sch + Pr C + Pr OI + P Co	108	32.4
Depressives	31	32.3
Neurotics	59	15.3
Neurotics—O-C	43	11.6
Patrol	54	9.3

Part II

Positive Scatter ≧ +2

Group	No. of Cases	% ≧ +2
U Sch	37	0
P Sch	26	15.4
Depressives	31	6.4
Neurotics	59	23.7
Neurotics—O-C	43	30.2
Patrol	54	20.4

TABLE 15-B.—*Differential Significance of Percentage of Cases*

Groups Compared	Chi² (d.f. = 1)	Significance
Part I		
(U Sch + P Sch + Pr C + Pr OI + P Co) : Neurotics	4.93	2–5%
(U Sch + P Sch + Pr C + Pr OI + P Co) : (Neurotics − O-C)	5.79	1–2%
(U Sch + P Sch + Pr C + Pr OI + P Co) : Patrol	9.17	<<1%
Depressives : Neurotics	2.58	10–20%
Depressives : (Neurotics − O-C)	3.55	5–10%
Depressives : Patrol	5.67	1–2%
Neurotics : Patrol	.46	50%
Part II		
U Sch : Neurotics	8.46	<<1%
U Sch : (Neurotics—O-C)	11.23	<<<1%
U Sch : Patrol	6.76	<1%
P Sch : Patrol	.05	80–90%
Depressives : (Neurotics—O-C)	4.92	2–5%
Depressives : Patrol	1.97	10–20%
(Neurotics—O-C) : Patrol	.78	30–50%

prehension score and the mean of the *other* Verbal subtest scores. It will be remembered that Vocabulary is included as a Verbal subtest, while Digit Span and Arithmetic are excluded.

Table 16 presents the frequency of cases in the various groups having a Comprehension score 3 or more units below the Modified Verbal Mean. Here again the Schizophrenics have been combined with the Preschizophrenics, since they show the same pattern of impairment of Comprehension. Table 16 shows that the most significant incidence of such great Modified Mean Scatter occurs in the Schizophrenics and Depressives, and almost not at all in the Normals. The Neurotics occupy a middle position in this respect. Among the Schizophrenics, the Paranoids tend to be the least impaired. The Normals are more sharply differentiated from the Depressives here than they were by Vocabulary Scatter of Comprehension, which indicates that the use of the Modified Mean Scatter is helpful in bringing to the surface trends which remain more or less hidden in other scatter measures. Even a tendency for the Neurotics to do somewhat worse on Comprehension than on the other Verbal subtests becomes apparent here. Among the Neurotics, the Obsessive-Compulsives tend to be the most impaired.

TABLE 16-A.—MODIFIED MEAN SCATTER OF COMPREHENSION.

Percentage of Cases with M. M. S. $\leqq -3$

Group	No. of Cases	$\% \leqq -3$
U Sch + P Sch + Pr C + Pr OI + P Co	108	30
Depressives	31	26
Neurotics	59	17
Neurotics—O-C	43	14
Patrol	54	4

TABLE 16-B.—*Differential Significance of Percentage of Cases*

Groups Compared	Chi^2(d.f. = 1)	Significance
(U Sch + P Sch + Pr C + Pr OI + P Co) : Neurotics	3.52	6%
(U Sch + P Sch + Pr C + Pr OI + P Co) : (Neurotics—O-C)	3.22	8%
(U Sch + P Sch + Pr C + Pr OI + P Co) : Patrol	12.44	<<1%
Depressives : Neurotics	.87	30–50%
Depressives : (Neurotics—O-C)	.97	30%
Depressives : Patrol	6.89	<1%
Neurotics : Patrol	2.85	9%

We conclude that Schizophrenics have Comprehension scores not only much below their Vocabulary level but also below the mean of the other Verbal scores, which themselves are low. The Depressives, whom we have seen to suffer a lowering of Vocabulary level, indicate their impaired judgment by a Comprehension score which is below the Modified Verbal Mean. There is a trend for the Neurotics to have a Comprehension score somewhat below the otherwise well-retained Modified Verbal Mean. It is most characteristic of the Normals to have a Comprehension score on the same level with the Vocabulary and other Verbal scores. In other words, the Normals more than any other group show a clustering of the scores of the 4 essentially Verbal subtests.

The use of the Modified Verbal Mean also makes it possible to analyze superior performance on Comprehension, as compared to the other Verbal subtests. If we consider as a relatively superior performance any Comprehension score which is two or more weighted score units above the Modified Verbal Mean, we find that 20% of our Normals, 12% of the Neurotics, 6% of the Preschizophrenics, 11% of the Paranoid Schizophrenics, and none of the Unclassified and Simple Schizophrenics meet this requirement. It is interesting to note that 3 cases of the Depressive Psychoses, or 20%, give a relatively superior performance on Comprehension; but as we have already found, there is also a significant tendency for other Depressive Psychotics to have a Comprehension score much below the Modified Verbal Mean. Apparently these cases with high efficiency on Comprehension have other Verbal scores which are considerably impaired, because it is shown in Table 18-A that none of the Depressive Psychotics has a really high Comprehension score.

TABLE 17.—*Frequency of Extremely Low Weighted Scores on Comprehension*

Part I

Weighted Comprehension Scores ≦ 5

Group	Frequency	% of Group
U Sch.	4	10
P Sch.	1	4
(P + U) Sch D.	3	25
DP + DI.	0	0
Neurotics.	0	0
Patrol.	0	0

Part II

Weighted Comprehension Scores ≦6

Group	Frequency	% of Group
U Sch.	6	16
P Sch.	1	4
DP + DI.	5	15
Neurotics.	1	2
Patrol.	0	0

9. Analysis of the Extreme Weighted Scores of the Comprehension Subtest.

In order to clarify further the limits and significance of the scatter, we tabulated the number of cases in each clinical and control group having extreme weighted scores on the high and low ends of the weighted-score continuum. The distribution of the low weighted scores over the groups is represented in Special Figure 2, and that of the high weighted scores in Special Figure 3. The great drops of Comprehension scores are presented in Table 17, which gives in its first part the number of cases having weighted scores of 5 or less, and in its second part the number of cases having weighted scores of 6 or less. Special Figure 2 may be consulted in this respect; it indicates that Comprehension is more open to impairment than any other Verbal subtest, for it shows the greatest number of cases having weighted scores of 5 or less. The first part of Table 17 shows that all 5 cases having such low weighted scores are Schizophrenics, and that 3 of these 5 cases are Deteriorated Schizophrenics. The second part of this Table is diagnostically more useful, since the limit of 6 allows for greater representation of other groups. Here it becomes clear that the Unclassified Schizophrenics and Psychotic Depressives far exceed all the other groups in the number of cases having such a low weighted score. It is significant that none of the Patrol, and only one Neurotic, has a weighted score of 6.

Table 18-B presents a summary of the major clinical and control groups in respect to percentage of cases having high weighted scores. If one uses a lower limit of 14, it appears that one out of every three or four Neurotics and Normals will have such a high weighted score; only one out of ten Schizophrenics, and only one out of sixteen Depressives, is likely to. If we increase the lower limit to 15, it appears that one out of every six or eight Neurotics or Normals will have such high weighted scores; only one out of every 20 or 30 psychotic cases will. This difference between the Schizophrenics and Depressives on the one hand, and the Neurotics and Patrol on the other, is shown in Table 18-C to be significant. It is outstanding that such high scores

TABLE 18-A.—*Frequency of High Weighted Scores on Comprehension in Each Group (14, 15, 16)*

Group	No. of Cases	No. of Cases Having Weighted Scores of:			Group	No. of Cases	No. of Cases Having Weighted Scores of:		
		14	15	16			14	15	16
U Sch A	17	2	2	—	DP	8	—	—	—
U Sch Ch	13	1	—	—	DI	7	1	—	—
U Sch D	7	—	—	—	DSN	9	—	—	1
					DN	7	—	—	—
P Sch A	11	1	—	—					
P Sch Ch	10	—	1	—	Hy	18	3	2	—
P Sch D	5	—	—	—	A & D	10	2	—	4
					MN	9	—	—	2
P Co	13	3	—	—	O-C	16	1	—	2
S S	9	—	1	—	Neuras	6	—	—	—
Pr Co	16	3	1	—	Patrol (1)	32	5	2	3
Pr OI	16	3	2	1	Patrol (2)	17	2	2	—
					Patrol (3)	5	1	—	—

TABLE 18-B.—*Frequency of High Weighted Scores on Comprehension (14, 15, 16)**

Group	No. of Cases Having Weighted Scores of:			Percentage of Group with:	
	14	15	16	14, 15 or 16	15 or 16
U Sch	3	2	—	14	5
P Sch	1	1	—	8	4
(P + U) Sch	4	3	—	11	5
Depressives	1	—	1	6	3
Neurotics	6	2	8	27	17
Patrol	8	4	3	28	13

* No weighted score of 17 (perfect score) was present in our entire population.

are absent in the Deteriorated Schizophrenic, and well-nigh absent in the Depressive Neurotic and Psychotic and the Neurasthenic groups. If we consider only the column referring to the score 16, we see that no Schizophrenic achieves such a high score, and only one Preschizophrenic and one Depressive achieve it. Neither the precariously-adjusted nor the maladjusted Patrol are represented in this column.

TABLE 18-C.—*Differential Significance of Frequency of High Weighted Scores*

Groups Compared	Chi^2(d.f. = 1)	Significance
(P + U) Sch : Neurotics	4.11	2–5%
(P + U) Sch : Patrol	4.25	2–5%
Depressives : Neurotics	4.21	2–5%
Depressives : Patrol	4.34	2–5%

10. General Diagnostic Conclusions.

(a) Complete failures on the six easy Comprehension items are most characteristic of Schizophrenics and Psychotic Depressives. Such misses are almost non-existent in Normals, and are to be considered indicative of impaired judgment. If easy items are failed and difficult items are passed, the question of psychosis arises.

(b) A Comprehension score below the Information score indicates that one's knowledge is not being used effectively in dealing with reality problems, and therefore is indicative of impaired judgment. This pattern is characteristic for psychotics and, to a lesser extent, Obsessive-Compulsive Neurotics. The Hysterics tend to have a Comprehension score higher than their impaired Information score.

(c) A Comprehension score below the Vocabulary score is characteristic of Schizophrenics (especially the Chronic and Deteriorated cases) and Depressives (especially the Psychotic cases). Even the Preschizophrenics, who are in general well-preserved, tend to have impaired judgment as estimated by this measure. Normals, and Neurotics with the exception of the Obsessive-Compulsives, have relatively few such cases.

(d) Scatter of Comprehension below the Modified Verbal Mean follows the same pattern given in (c).

(e) High weighted Comprehension scores are most frequent in Neurotics and Well-Adjusted Normals; they are almost entirely absent in the psychotic groups.

(f) Among the Schizophrenics, if the Comprehension score is well-retained, the case is most likely to be a *Paranoid* Schizophrenic. This is an important finding for differential diagnosis within the boundaries of Schizophrenia.

G. INFORMATION

1. Introduction. The Information subtest of the Bellevue Scale consists of 25 items.[44] All these items can and should be answered by a simply stated fact.[45] The raw score of this subtest is the number of passed items, which is translated into a weighted score with the help of Wechsler s table.[46] The subtest is one of the group of essentially Verbal subtests to which Comprehension, Similarities, and Vocabulary also belong. Of all these subtests, Information stands closest to Vocabulary, both requiring statement of a piece of information; of the two, Vocabulary is the simpler, as it requires the definition of generic terms, while Information refers rather to specific facts. The nature of Information, with its refractoriness to impairment and to late improvement, and the close adherence of its scores to Vocabulary scores, has already been indicated in the section on the Comprehension subtest. Regrettably, the Bellevue Manual does not offer correlations of Vocabulary with other subtests, by means of which the close relation of Information and Vocabulary in a large "normal" population could be demonstrated.

2. The Psychological Rationale of the Information Subtest. In our introductory section we devoted considerable space to a discussion of the nature and development of intelligence. We pointed out that it is a prerequisite for systematic clinical psychological practice to look upon intelligence as a function of a natural endowment unfolding in a process of maturation, in the course of which, if the functioning of the individual is unhampered, it will undergo a process of "picking up" information of facts and knowledge of relationships from its "educational environment"; this process will depend upon the poverty or wealth of the "educational environment", which includes the home, the relatives, their social relationships, and the geographical-cultural location and its implications. We also dwelt upon the arrests and setbacks, which this function may succumb to, and the forms of its deterioration. We pointed out that the educational environment yields in part, earlier or later, to schooling and that where schooling leaves off there may or may not follow special "cultural predilections" to complement all that the educational environment and schooling have accomplished.

---

[44] 1. Who was President before Roosevelt? 2. Where is London? 3. How many pints make a quart? 4. From what is rubber obtained? 5. What is a thermometer? 6. How many weeks are there in a year? 7. What is the capital of Italy? 8. When is Washington's birthday? 9. How tall is the average American woman? 10. Who invented the airplane? 11. How far is it from Paris to New York? 12. Where is Brazil? 13. Who wrote Hamlet? 14. Who discovered the North Pole? 15. What is the Vatican? 16. What is the capital of Japan? 17. What does the heart do? 18. What is the population of the U. S.? 19. Who wrote Huckleberry Finn? 20. Where is Egypt? 21. What is the Koran? 22. Who wrote Faust? 23. What is an Habeas Corpus? 24. What is ethnology? 25. What is the Apocrypha?

[45] The only exception here is the 23rd item, "What is an Habeas Corpus?" which requires a relatively elaborate explanation.

[46] See Wechsler (28), page 182.

In analyzing and interpreting the Information subtest, the examiner should keep in mind these considerations more than in any other of the subtests. To "pick up", out of the educational and cultural environment, information of factual data is a much simpler and more direct process than to "pick up" knowledge of relationships. Here endowment, wealth of the educational environment, degree of schooling and of cultural predilection, come more clearly to an expression than in any other subtest except Vocabulary. At the same time, impairment and arrest must set in early to have a prohibiting effect upon the accumulation of information. Furthermore, deterioration, or disorganization of function by acute disturbances, must be considerable before it will encroach significantly upon availability—in the test situation—of information, once accumulated. It is true that information, like all memory material, can become momentarily unavailable as a result of a "temporary inefficiency"—that is, in a situation full of anxiety where the proper attitude, which mobilizes the memory of information, may be disturbed. Such impairments are usually spotlike, however, and do not cover a large part of the field of information as reflected in the responses to the 25 questions of the Information subtest. Similar spotlike impairments may be also expressions of generalized "repressive" trends.

Thus, the nature of the Information subtest allows the hope that a careful analysis of it will give a clue as to the endowment, early arrest of maturation, early setbacks, wealth of the educational environment, degree of schooling and cultural predilections, and finally the severity of the present maladjustment—that is, whether its effects are merely temporary inefficiencies, or essential inefficiency of function which prohibits the making available in the testing situation of information possessed.

Another aspect of the responses to Information deserves discussion here. To pass successfully the Information items requires the delivery into consciousness of material acquired in the past. In other words, Information implies a memory function. It is true that some of the items are so "habituated" that we no longer notice that memory plays a rôle in them (e.g., "Who is the President of the United States?" "Roosevelt"); but other items readily show the memory function involved. A dynamic theory of memory is relevant to the background of the Information subtest.

Let us start from test observations. Information items usually elicit either a quick response—right or wrong—or a response such as "I have it on the tip of my tongue . . . I know it so well . . . I just can't say it now." Though there are cases where a number of possibilities are stated, and no choice or the wrong choice is made, these "doubt laden" performances are relatively rare.

What is the psychological meaning of these two typical performances? We submit that memory functioning is only to a small extent directable by conscious, voluntary effort. If the information is not readily available, "forcing" is in most cases futile. If not forced, the answer may later, either in effortless reflection or automatically, "pop" into consciousness. Freud, in his "Psychopathology of Everyday Life" elucidated the nature of such "forgetting", and showed that the forgotten information as well as the reason for its having been forgotten can be discovered in a process of free association. The Freudian theory of "forgetting" has bearing on memory functioning[47] in general and on the function underlying Information in particular. The availability of information is dependent upon strivings and interests—in other words, on certain conative factors delivering the information into consciousness. Such delivery occurs on proper stimulation—in this case, the Information question—only if no other overvalent conative factors press their ideational representations into consciousness at the expense of those relevant to the stimulus, and if no generalized difficulty—repression—impedes conative factors in delivering the necessary information.

Thus, information is either possessed by a subject or it is not, depending upon the wealth of the educational environment from which it is "picked up", and the strength of function—conative factor—which "picks it up". Information once possessed is not available if a "temporary inefficiency" is caused by stray overvalent conative tendencies blocking those appropriate to the stimulus question from delivering the information into consciousness. Information once possessed may become available with difficulty, by reason of strong generalized repression which affects information even distantly related to the essential repressed material. Finally, information may become unavailable when, as in schizophrenic psychoses, "meanings' become generalized and instead of specific information we are given symbolic substitutes, parts for wholes, and so on.

3. Administration. A few points concerning administration, not covered by the Bellevue Manual, should be noted here.

In keeping with the views advanced above, we adopted the rule that whenever a subject claimed to know the answer but to be unable to give it at the moment, we credited it with a passing score if it was offered to us in the course of the same testing session. In fact the patient was encouraged: "Skip it now, and let me know if it comes to you later."

If the patient answered a question in an either-or fashion, we insisted upon his deciding between the two, and gave the correct choice a passing credit.

---

[47] See in this connection Rapaport (22), Chapter V.

In questions where a quantitative latitude is allowed—such as the one on the population of the United States—if the patient stated, "I don't know", or "It would be only a guess", we always encouraged, and in fact insisted upon, guesses. Guesses, when correct, were usually taken to imply overcaution and doubt; when incorrect, they were sometimes incongruities—such as 100 billion people in the U.S.—barely possible in cases other than psychotics.

On questions where explanation is needed (What is a thermometer? What does the heart do?) or where alternatives, guesses, and answers for which latitude is allowed are given, responses should be recorded verbatim, and not merely scored as passed or failed. These responses, and their relation to each other, are often qualitatively revealing. Overmeticulous and doubt-laden answers, where first one and then another answer is given, are also significant and should be recorded verbatim. Where easy items are missed, or where the answers contain "peculiar" features, inquiry should be made to determine whether it is the result of a "temporary inefficiency" or the reflection of psychotic disorganization of memory and of thought processes in general.

4. Item Analysis of the Information Subtest. In our clinical work we found that the 25 items of the Information subtest fall roughly into three groups. The first group consists of items the answers to which are, in the course of unhampered normal maturation, picked up by everyone with fair natural endowment. The second group consists of items the answers to which are picked up either in a fairly rich educational environment, or in the course of schooling extending over the greater part of high school. The third group consists of items the answers to which are learned only by persons who, either by profession or by special cultural predilection, come into touch with them. The relationship of the achievements on these three groups of the Information items easily reveals the mental defectives by their marked failure on the second group, total failure on the third group, and the presence of striking failures in the first group. Poverty of educational and schooling environment shows up in marked failures in the second group, when the first group is passed well. Attainments based on cultural predilections manifest themselves in success in the third group. Successes on the second and third groups accompanied by many and striking failures on the first group, or queer failures on the second group, are rarely found except in psychoses. Isolated misses in the first part—especially if soon corrected by the subject upon questioning—when the rest of the test is well-balanced and tallies with the actual education and background of the subject, is usually a sign of temporary inefficiency; this will be found mainly in anxious or "repressing" subjects.

The tabulation of misses of the well-adjusted group of patrolmen substantiates this clinical experience. It divides the 25 Information items into three groups, in terms of increasing difficulty. The group of first degree of difficulty, the "easy" items, includes items 2, 3, 4, 5, 6, 7, 10, 12, 16, 17.[48] The second, the "intermediate" items, includes items 1, 8, 9, 11, 13, 14, 15, 18, 19, 20.[49] The third, the "difficult" items, includes items from 21 to 25.[50]

The statistical basis for dividing the items into these three grades of difficulty will be found in Table 19-A. Here it is seen that our Well-Adjusted group of Normals missed only 2.2% of the easy group. No Patrolman in the Well-Adjusted group, and only three in the whole Patrol of 54 men (5.6%), missed *two or more* of the easy items; though temporary inefficiency (1 miss of these 10 easy items) occurred in 23% of the cases. On the second group, our Well-Adjusted Patrol missed 24.7% of the items; in the third group, they missed 79.4%.

Figure 12 represents the differentiation of the three groups of items. The horizontal axis presents all the clinical and control groups; the units of the vertical axis are percentages of misses. The graph shows that there is no overlapping in the percentage of misses in the three degrees of difficulty. The graphline for the easy items shows that those are failed mainly by Depressive Psychoses and Deteriorated Paranoid Schizophrenics; the other Schizophrenics and Depressives follow. The Patrol misses hardly any in this group, although the Borderline-Adjusted Patrol, like the Neurotics, have some misses. The intellectualizing groups—Paranoid Conditions, Over-Ideational Preschizophrenics, Anxiety and Depressions, Obsessive-Compulsives—nearly match the well-adjusted Normals, having very few misses on these easy items. The graphline for the intermediate items gives little differentiation, except for showing that the Depressive Psychotics and the Deteriorated Unclassified Schizophrenics have the highest percentage of failures, and that the intellectualizing groups do as well as, if not better than, the Normals. The graphline for the difficult items shows that all the groups have a high percentage of misses, except two intellectualizing groups—Over-Ideational Preschizophrenics and Obsessive-Compulsives. Table 19-A presents the analysis of the frequency of the failures on the easy items; Table 20-A presents an analysis in terms of cases failing *two or more* easy items. These tables show that both ways of dealing with the distribution give parallel results, though the distribution in terms of failures gives a better differentiation than the distribution in terms of cases. In other words, not all the cases of Schizophrenia and Depression have failures on the easy group, but those who do tend to have them do so to a marked extent. What the statistics cannot show here is that sometimes a single failure is, by its queer character or by comparison to the whole protocol, diagnostic in itself.

---

[48] Group 1: 2. Where is London? 3. How many pints make a quart? 4. From what is rubber obtained? 5. What is a thermometer? 6. How many weeks are there in a year? 7. What is the capital of Italy? 10. Who invented the airplane? 12. Where is Brazil? 16. What is the capital of Japan? 17. What does the heart do?

[49] Group 2: 1. Who was President before Roosevelt? 8. When is Washington's birthday? 9. What is the average height of American women? 11. How far is it from Paris to New York? 13. Who wrote Hamlet? 14. Who discovered the North Pole? 15. What is the Vatican? 18. What is the population of the United States? 19. Who wrote Huckleberry Finn? 20. Where is Egypt?

[50] Group 3: 21. What is the Koran? 22. Who wrote Faust? 23. What is an Habeas Corpus? 24. What is Ethnology? 25. What is the Apocrypha?

TABLE 19-A.—*Percentage of Misses on Information Items of 3 Levels of Difficulty*

Group	Percentage of Misses on:		
	Easy	Intermediate	Difficult
U Sch A	14.1	31.8	80.0
U Sch Ch	6.9	28.5	70.8
U Sch D	17.1	43.0	85.7
P Sch A	10.0	31.8	83.6
P Sch Ch	15.0	40.0	92.0
P Sch D	22.0	38.0	72.0
P Co	4.6	20.0	69.2
S S	14.4	35.6	88.9
Pr C	3.8	20.6	73.8
Pr OI	2.5	16.2	55.0
DP	20.0	51.2	92.5
DI	25.7	44.3	88.6
DSN	17.8	37.8	88.9
DN	11.4	29.0	82.9
Hy	10.0	33.9	86.7
A & D	4.0	21.0	74.0
MN	7.8	26.7	75.6
OC	5.0	20.6	56.2
Neuras	10.0	36.7	96.7
P (1)	2.2	24.7	79.4
P (2)	8.8	32.9	85.9
P (3)	2.0	26.0	92.0
Special Groups:			
(P + U) Sch	13.0	34.1	80.6
Total Depr	18.7	40.6	88.4
Neurotics	7.3	27.3	75.6
Neurotics − Hy	6.1	24.4	70.7
Total Patrol	4.3	27.4	82.6

Table 19-B and Table 20-B both show a significant prevalence of failures on the easy items in the Schizophrenic and Depressive groups, in comparison with the Neurot-

TABLE 19-B.—*Differential Significance of Frequency of Misses on Easy Items*

Groups Compared	Chi²(d.f. = 1)	Significance
(P + U) Sch : Depr	5.31	2–5%
(P + U) Sch : Neurotics	10.87	<<1%
(P + U) Sch : (Neurotics − Hy)	12.88	<<1%
(P + U) Sch : Patrol	27.29	<<<1%
Depressive : Neurotics	26.61	<<<1%
Depressive : (Neurotics − Hy)	27.53	<<<1%
Depressive : Patrol	47.70	<<<<1%
Hy : (Neurotics − Hy)	2.82	5–10%
Neurotics : Patrol	4.70	2–5%
(Neurotics − Hy) : Patrol	1.64	20%
Hy : Patrol	8.28	<1%

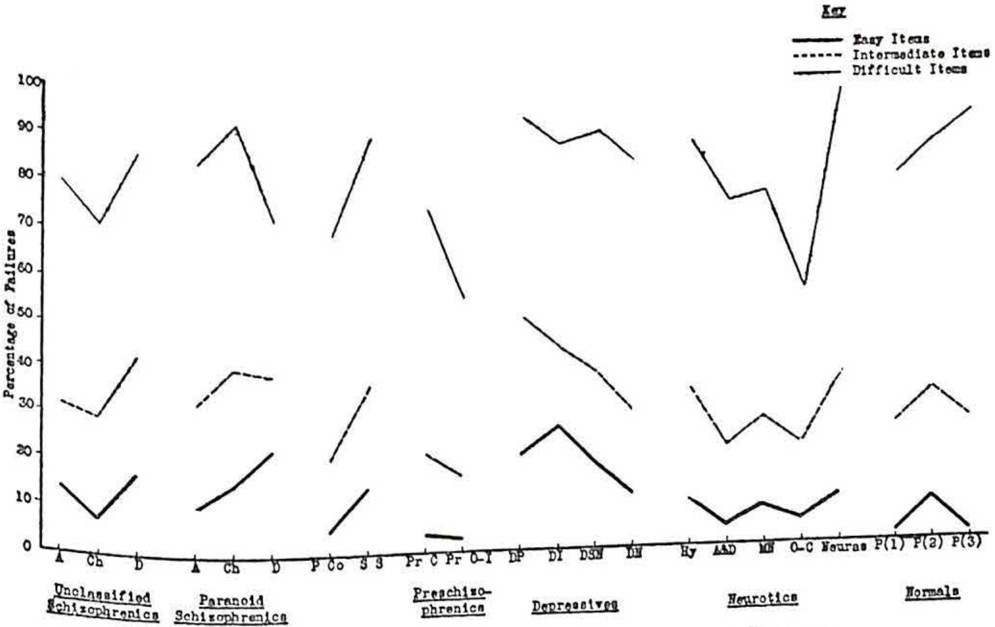


FIG. 12.—ITEM ANALYSIS OF THE INFORMATION SUBTEST
Percentage of Items Failed at Each of the Three Degrees of Difficulty

ics and Normals. Two of the Neurotic groups, however, do worse on these easy items than the other Neurotic groups; these are the Hysterics and the Neurasthenics. We have already seen, in the analysis of Vocabulary efficiency, that it is characteristic of the Neurasthenics to show widespread impairment on all levels of difficulty. The striking deviation therefore appears to be that of the Hysterical group, which until now has shown no unique irregularities as compared to the other Neurotic groups. One third of the cases of the Hysterical group misses two or more of these easy items, clearly revealing the impaired efficiency for accumulating information, and/or having it readily available. This is the first outstanding scatter characteristic of the Hysterical group, and may be justifiably brought into relation with repression, which is the clinically outstanding feature of this group.

TABLE 20-A.—*Percentage of Cases with More than One Miss on Easy Items*

Group	No. of Cases	% who missed > 1
U Sch A	17	35
U Sch Ch	13	15
U Sch D	7	71
P Sch A	11	18
P Sch Ch	10	50
P Sch D	5	60
P Co	13	8
S S	9	33
Pr C	16	6
Pr OI	16	6
DP	8	50
DI	7	71
DSN	9	44
DN	7	43
Hy	18	33
A & D	10	10
MN	9	11
O-C	16	12
Neuras	6	33
P (1)	32	0
P (2)	17	18
P (3)	5	0
Special Groups:		
(P + U) Sch	63	37
Depr	31	52
Neurotics	59	20
Neurotics – Hy	41	15
Patrol	54	6

We conclude that the incidence of two or more misses on these easy Information items is most characteristic of Schizophrenics and Depressives; however, Hysterics and Neurasthenics may do as poorly. Normals missing two or more of these items are extremely rare.

A comment is in place here on the failures of the Patrol on the difficult group of Information items. Its training and occupational background makes possible a relatively superior group performance on the question, "What is an Habeas Corpus?" Otherwise the percentage of failures on the difficult group in the Patrol would have been at least equal to that of the Depressive groups. This again is a demonstration of the reflection on the test of specific conditions of life, and the importance of keeping in mind the background of the subject when evaluating item breakdown.

In summary, the breakdown of the items into groups of increasing difficulty, and analysis of single items themselves, may give the examiner diagnostic clues. He should set up hypotheses as soon as failures or peculiar responses occur; and he should follow these hypotheses through the rest of the Information items, to ascertain whether these failures or peculiar responses were temporary inefficiencies, or impairments, or even indicators of mental deficiency. If the Information items do not themselves make for a decision on these hypotheses, the rest of the test may give the answer. In the meantime, however, Information items will give indications of the endowment, wealth of background, schooling, and cultural predilections of the subject.

TABLE 20-B.—*Differential Significance of Percentage of Cases*

Groups Compared	Chi^2(d.f. $= 1$)	Significance
(P + U) Sch : Depr.	1.38	20–30%
(P + U) Sch : Neurotics	3.14	5–10%
(P + U) Sch : (Neurotics − Hy)	4.87	2–5%
(P + U) Sch : Patrol	12.88	<<1%
Depr : Neurotics	7.87	<1%
Depr : (Neurotics − Hy)	9.70	<<1%
Depr : Patrol	21.49	<<<1%
Hy : (Neurotics − Hy)	1.67	20%
Neurotics : Patrol	4.14	2–5%
(Neurotics − Hy) : Patrol	1.57	20–30%
Hy : Patrol	7.15	<1%

5. Vocabulary Scatter and Mean Scatter of Information: "t"-Test. In the clinical procedure, the examiner first goes through a careful scrutiny of the items of a subtest—comparable to our item-analysis—and only then turns to the investigation of the relationship of the total yield (weighted score) of the subtest to that of other subtests.

The position of the Information test among the other subtests of the Bellevue Scale may be seen in Special Figure 1. Here the Vocabulary

Scatter of each subtest is graphed. The horizontal axis represents the different clinical and normal groups; the vertical axis represents the amount of scatter, negative scatter being charted above and positive below the axis—in other words, the axis itself represents the average Vocabulary level of each of our groups. The deviations (Vocabulary Scatter) from this of each of the subtest scores are averaged and graphed separately for each clinical category. The Information subtest is represented together with the Comprehension subtest, for reasons already discussed. Inspection of the five parts of this Figure, representing all ten subtests of the Bellevue Scale, shows that of all subtests Information scatters the least from Vocabulary. There are two reasons for this. First, the verbalization of some of the Information questions—for example, "What is the Koran?"—does not differ in any way from the verbalization of some of the Vocabulary questions—for example, "What is a proselyte?". Secondly, our discussions of the psychology of Vocabulary and the psychology of Information show that both are, in great part, spontaneously and unwittingly acquired out of one's environment. We showed that Vocabulary is the most stable subtest. It is somewhat more stable than Information because it is more inadvertently picked up in everyday life by a normally functioning individual.

The statistical significance of the deviations from zero of the Vocabulary Scatter of Information, plotted on Graph 1 of Special Figure 1, can be read on Special Table 1. Here it is shown that only in three groups does Information significantly deviate from Vocabulary. In two groups—the Simple Schizophrenics and the Coarctated Preschizophrenics—this deviation is in the positive direction; that is, the Information score is higher than the Vocabulary score. In both instances the reason appears to lie in the poor Vocabulary scores of these groups. The only significant deviation in the negative direction occurs in the Involutional Depressives, a deviation which can be used to spot them. Only two other mild trends toward deviation in the negative direction are indicated: Chronic Paranoid Schizophrenia and Hysteria. The meaning of the negative Vocabulary Scatter of Hysterics was discussed in the Comprehension section[51] and in the section dealing with the psychology of Information.

Let us now turn our attention to Special Table 2, which gives the significance of the deviations of the Mean Scatter from zero. Obviously the most significant scatter will show up both on the Vocabulary and Mean Scatter. Special Table 2 indicates that the two groups which showed a significant positive Vocabulary Scatter—the Coarctated Preschizophrenics and Simple Schizophrenics—show also a positive Mean Scatter; the significance of the latter is, however, less than that of the former. This discrepancy in significance between the Vocabulary Scatter and the Mean Scatter indicates that Vocabulary is lower than the other Verbal subtests in the two clinical groups in question, and thus Information does not stand as clearly above the Verbal Mean as it does above the Vocabulary level. It must also be taken into consideration that the Information score itself enters the calculation of the Verbal Mean, and thus decreases the difference between itself and the Verbal Mean. While the Involutional

---

[51] See pages 120–122.

Depressives had a significant negative Vocabulary Scatter of Information, their Mean Scatter is not significant statistically: that is, *all* the Verbal scores are lowered, and not only that of Information; only Vocabulary resists impairment. The trend of Hysterics to have a negative Vocabulary Scatter of Information is reinforced by a similar trend in their Mean Scatter. The tendency of Chronic Paranoid Schizophrenics toward negative Vocabulary Scatter of Information is not paralleled by a similar trend in their Mean Scatter, because apparently the rest of the Verbal subtests tend to drop.

Special Table 2 indicates two clinical groups whose positive Mean Scatter of Information approaches significance, though their Vocabulary Scatter does not. These groups are the Chronic Unclassified Schizophrenics and the Obsessive-Compulsives. In other words, while the Information of these two groups does not tend to be higher than their Vocabulary, it is higher than their other Verbal subtests.

We conclude that (a) an impaired Vocabulary score associated with a relatively well-retained Information score is characteristic of the Simple Schizophrenics; (b) a relative preservation of the Vocabulary and Information scores, where all the other Verbal scores are low, is characteristic for the Chronic Unclassified Schizophrenics and Obsessive-Compulsives; (c) a great drop of the Information score below the Vocabulary level is most characteristic of the Involutional Depressives and, to an extent, of the Chronic Paranoid Schizophrenics; (d) there is a tendency among the Hysterics to have an Information score somewhat lower than the Verbal Mean and Vocabulary.

6. Vocabulary Scatter. We shall now consider the distribution of cases into ranges of Vocabulary Scatter of Information.

Figure 13 represents the distribution of high and low Vocabulary Scatter of Information. The graph shows that the Involutional Depressives stand out with the greatest percentage of cases of great negative Vocabulary Scatter. They are followed by the Chronic and Deteriorated Paranoid Schizophrenics. Diagnostically these results are significant, because they represent an increase of negative scatter as we progress in the Paranoid group from the Acute through the Chronic to the Deteriorated cases. The same trend is reflected in the progressive decrease of the percentages of positive scatter measures in this Paranoid sequence.

Of the other groups having a somewhat higher percentage of cases showing negative Information scatter, only the Hysterics deserve to be considered in particular; the other groups have such a large share of cases with great *positive* scatter that negative scatter cannot be considered characteristic of them. The Hysterics, however, show a relatively high percentage of cases with negative, and a relatively low percentage of cases with positive, scatter.

The two groups which stand out with an extremely high percentage of cases with positive scatter are the Simple Schizophrenics and the Coarctated Preschizophrenics.

In summarizing, one might state that Figure 13, representing the distribution of cases with positive and negative Vocabulary Scatter, gives evidence that the diagnostic signs inferred in the discussion of Special Table 1 hold true not only in terms of the size and significance of the *means*, but also in terms of the *distribution* of cases into ranges of positive and negative high and low Vocabulary Scatter. These measures, which are not only theoretically significant in terms of the deviations of their means from zero, but which are also significant in terms of distribution of cases, can be considered diagnostically valid indicators.

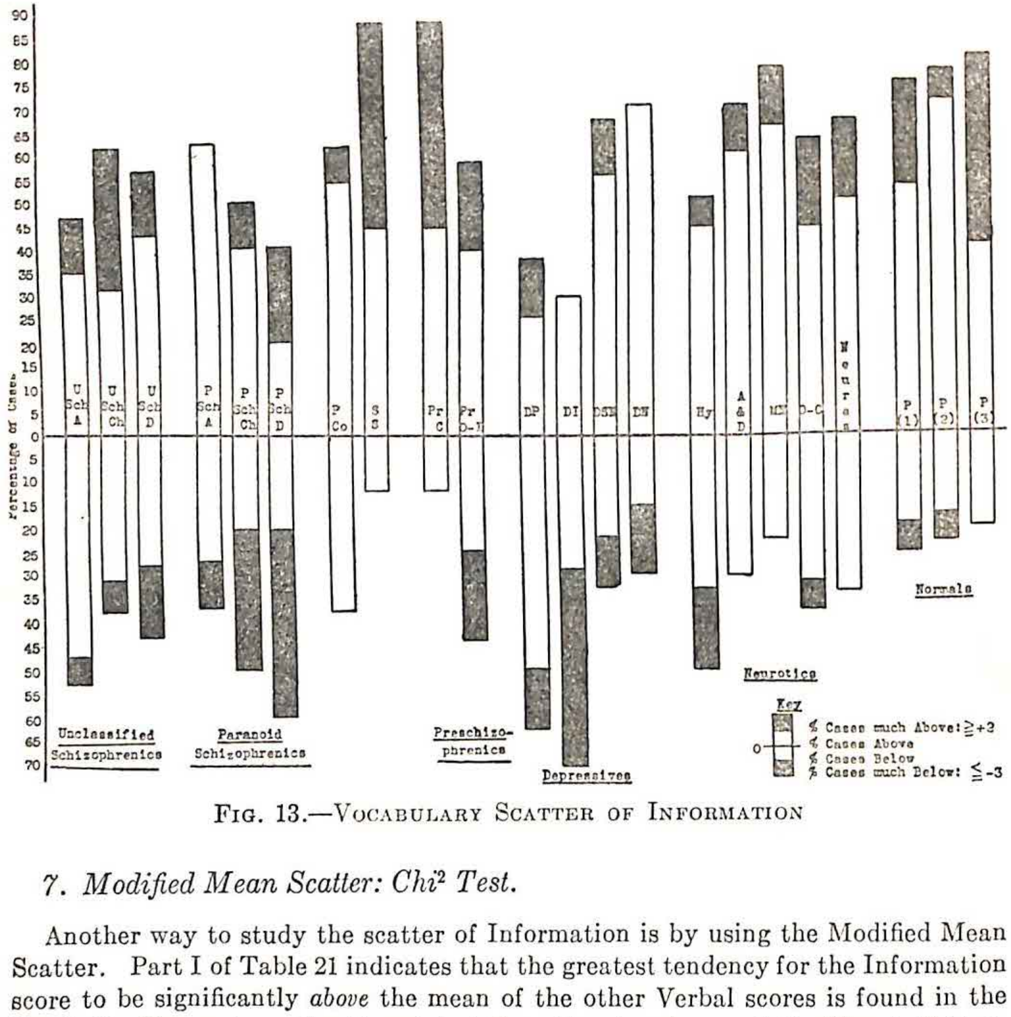


FIG. 13.—VOCABULARY SCATTER OF INFORMATION

7. *Modified Mean Scatter: Chi^2 Test.*

Another way to study the scatter of Information is by using the Modified Mean Scatter. Part I of Table 21 indicates that the greatest tendency for the Information score to be significantly *above* the mean of the other Verbal scores is found in the Psychotic Depressives, the Coarctated Preschizophrenics, and the Simple Schizophrenics; these are followed by the Obsessive-Compulsives and the Unclassified Schizophrenics. We have already seen, in the section on Major Scatter Patterns, that these are the groups most likely to have impairment of the Verbal subtests. The fact that the Information score remains relatively high in these groups attests to its great stability and yields a *pattern* of impairment of these groups. In the Neurotics—excluding the Obsessive-Compulsives—and in the Normals, there are few cases where Information scores are well above the Modified Verbal Mean; this is evidence of the general retention of efficiency on all the Verbal subtests.

Part II of Table 21 indicates that the incidence of Information scores *below* the Modified Verbal Mean is greatest in the Depressives, and occurs to a lesser extent in the Hysterics, Anxiety and Depression, and Paranoid Schizophrenic groups.

Part III of Table 21, which presents special Chi² comparisons, reveals that the Hysterics are significantly different from the Obsessive-Compulsives in respect to distribution around the Modified Verbal Mean: the Hysterics' Information scores tend to be lower than, and the Obsessive-Compulsives' higher than, the remaining Verbal subtest scores. This is a clear-cut and important finding. It supports two of our general contentions: (a) the prominent rôle of repression in the Hysterics results in encroachment upon their acquisition and retention of information; (b) information once acquired in persons other than the "repressive" type is resistant to impairment, and stands up well though other verbal functions may be impaired. This is especially true when acquisition of information is part of a general "intellectualizing" trend in the personality, as in the Obsessive-Compulsives.

TABLE 21-A.—MODIFIED MEAN SCATTER OF INFORMATION

Part I

Percentage of Cases with M.M.S. ≧ +2

(Above the Modified Mean)

Group	No. of Cases	% ≧ +2
U Sch.	37	27
P Sch.	26	15
S S.	9	33
Pr C.	16	38
DP.	8	38
Neurotics.	59	14
O-C.	16	31
Neurotics − O-C.	43	7
Patrol.	54	9

Part II

Percentage of Cases with M.M.S. ≦ −2

(Below the Modified Mean)

Group	No. of Cases	% ≦ −2
U Sch.	37	8
P Sch.	26	19
Depr.	31	34
Hy.	18	22
A & D.	10	20
O-C + MN + Neuras.	31	6
Patrol.	54	7

The distribution of the *extreme* high and extreme low values of the Modified Mean

Scatter is also revealing. Tables 22-A and 22-B present the frequency in the different groups of Information scores very much above and very much below the Modified Verbal Mean. Three main trends are indicated: (a) an extreme superiority

TABLE 21-B

Part I

Differential Significance of Percentage of Cases

Groups Compared:	Chi^2(d.f. = 1)	Significance
U Sch : P Sch	.62	30–50%
P Sch Ch : U Sch Ch	1.13	20–30%
U Sch : DP	—	—
U Sch : Neurotics	1.90	10–20%
U Sch : (Neurotics − O-C)	4.49	2–5%
U Sch : Patrol	3.83	5%
P Sch : (Neurotics − O-C)	.50	30–50%
P Sch : Patrol	.19	50–70%
S S : (Neurotics − O-C)	2.81	5–10%
S S : Patrol	2.11	10–20%
Pr C : (Neurotics − O-C)	6.21	1–2%
Pr C : Patrol	5.45	1–2%
DP : (Neurotics − O-C)	3.47	5–10%
DP : Patrol	2.75	5–10%
OC : (Neurotics − O-C)	3.97	2–5%
OC : Patrol	3.24	5–10%
OC : Hy	4.34	2–5%

Part II

Differential Significance of Percentage of Cases

Groups Compared:	Chi^2(d.f. = 1)	Significance
U Sch : P Sch	.85	30–50%
U Sch : Depr	2.70	10%
P Sch : Patrol	1.48	20–30%
Depr : (O-C + MN + Neuras)	2.98	5–10%
Depr : Patrol	4.09	2–5%
Hy : (O-C + MN + Neuras)	1.37	20–30%
Hy : O-C	2.17	10–20%
Hy : Patrol	1.69	20%
A & D : (O-C + MN + Neuras)	.41	50–70%
A & D : Patrol	.44	50%

Part III

Differential Significance of the Distribution of Cases in three Ranges of M.M.S.:

$X \geqq +2, +2 > X > -2, X \leqq -2$

Groups Compared	Chi²(d.f. = 2)	Significance
P Sch : U Sch	2.44	30%
P Sch Ch : U Sch Ch	2.63	20–30%
Hy : O-C	9.14	1%

TABLE 22-A.—*Great Negative Modified Mean Scatter on Information*

(M.M.S. $\leqq -3$)

Group	Frequency
U Sch D	1
P Sch Ch	1
P Sch D	1
Pr OI	1
DP	1
DI	1
DN	1
Hy	3
MN	1

TABLE 22-B.—*Great Positive Modified Mean Scatter on Information*

(M.M.S. $\geqq 3.66$)

Group	Frequency
U Sch A	1
U Sch Ch	1
U Sch D	1
P Sch D	1
S S	1
DP	1

of Information efficiency over that of other verbal functions is present only in the psychotic groups; (b) an extreme impairment of Information efficiency below the other verbal functions is present mostly in psychotics; but (c) the Hysterics and the related Mixed Neurotics may also have such great impairment on Information.

We conclude that great scatter of the Information score in either direction from the Modified Verbal Mean is generally a sign of psychosis; however, extreme scatter below the Modified Verbal Mean may also be the reflection of a hysteriform maladjustment.

TABLE 23-A.—*Frequency of High Weighted Scores on Information*

Group	No. of Cases	No. of Cases Having Information Scores of				Percentage of Cases Having Information Scores of
		15	16	17	15 + 16 + 17	15, 16, or 17
U Sch A	17	2	1	—	3	18
U Sch Ch	13	4	—	—	4	24
U Sch D	7	—	—	—	—	—
P Sch A	11	2	—	—	2	18
P Sch Ch	10	—	—	—	—	—
P Sch D	5	—	—	1	1	20
P Co	13	1	1	1	3	23
S S	9	1	—	—	1	11
Pr C	16	3	1	—	4	25
Pr OI	16	5	3	1	9	56
DP	8	—	—	—	—	—
DI	7	—	—	—	—	—
DSN	9	—	1	—	1	11
DN	7	1	—	—	1	4
Hy	18	1	—	—	1	6
A & D	10	3	1	—	4	40
MN	9	2	—	—	2	22
O-C	16	4	1	2	7	44
Neuras	6	—	—	—	—	—
P (1)	32	6	2	—	8	25
P (2)	17	1	—	—	1	6
P (3)	5	—	—	—	—	—
Special Groups:						
(P + U) Sch	63				10	15.9
Depr	31				2	6.5
O-C + A & D + MN	35				13	37.1

8. Analysis of the Extreme Weighted Scores of the Information Subtest. We applied another method to test the extremely high and low ranges of Information: namely, considering the weighted scores themselves. Inspection of Special

Figure 2, representing extremely low weighted scores, indicates that there are only six cases in all our clinical and control groups which have a weighted score equal to or smaller than 5. Two of these are Deteriorated Paranoid Schizophrenics, two are Psychotic Depressives, and two are Involutional Depressives. The bar graph on Information in Special Figure 2 is significant in connection with the general appraisal of the nature of the Information subtest; it shows as eloquently as Special Table 1 that Information, like Vocabulary, tends to have not only the least scatter in general, but also the least number of extremely low weighted scores.

Table 23-A presents the frequency of extremely high weighted scores on Information—that is, the cases in each clinical and control group having a score of 15, 16, or 17—and the percentages of these combined. Table 23-B represents the differential significance of these distributions.

TABLE 23-B.—*Differential Significance of Frequency of High Weighted Scores*

Groups Compared	Chi^2(d.f. = 1)	Significance
O-C : (P + U) Sch	4.34	2–5%
O-C : Depr	7.23	<1%
O-C : P (1)	.98	30–50%
O-C : P (2 + 3)	6.37	1–2%
Hy : Neurotics—(Neuras + Hy)	4.58	2–5%
Hy : O-C	4.91	2–5%
A & D : (P + U) Sch	1.87	10–20%
A & D : Depr	4.39	2–5%
A & D : P (1)	.27	50–70%
A & D : P (2 + 3)	4.14	2–5%
Pr OI : (P + U) Sch	9.28	<<1%
Pr OI : Depr	12.0	<<1%
Pr OI : P (1)	3.29	5–10%
Pr OI : P (2 + 3)	10.24	<<1%
P (1) : (P + U) Sch	.63	30–50%
P (1) : Depr	2.79	5–10%
P (1) : P (2 + 3)	2.59	10–20%

The greatest relative frequency of such high scores is in the Over-Ideational Preschizophrenics, who contribute more than half of such cases; they are followed by the Obsessive-Compulsives and the Anxiety and Depression group. The first two of these three groups are frequently characterized in psychiatric literature as tending to show a "libidinization of thought processes". Information, intellectual pursuits, rationalization are usually the means by which this type keeps its tenuous hold on reality; and it is to be expected that their Information will hold up unusually well. The Over-Ideational Preschizophrenics, when compared with the other groups, show in general a statistically significant superiority in this respect. The Obsessive-Compulsives are distinguishable from all major groups except the Well-Adjusted Patrol.

This differentiation between the Obsessive-Compulsives and the Schizophrenics is to be kept in mind; otherwise the two groups are frequently very similar in pattern on the subtests of the Bellevue Scale. The sharp differentiation between the Obsessive-Compulsives and the Hysterics (44% versus 6%) again comes to the fore.

The Anxiety and Depression group is characterized in general by its well-retained Verbal subtests. It is noteworthy that the difference between this group and the Depressives is significant on a 2–5% level; this will serve as a diagnostic sign to differentiate the Anxiety and Depression group, which is a Neurotic group, from the genuine Depressions. This differentiation is otherwise difficult to make. We may note, as of theoretical importance, the tendency for the Well-Adjusted Patrol to have more high Information scores than the Maladjusted Patrol.

We conclude that high weighted Information scores are most characteristic of "intellectualizing" clinical groups, such as the Obsessive-Compulsives and the Over-Ideational Preschizophrenics, and of Well-Adjusted Normals. Psychotic Depression makes the attainment of high scores impossible, and hysterical makeup all but precludes the possibility of high scores.

9. General Diagnostic Conclusions.

(a) Misses on the 10 easy Information items are characteristic for Schizophrenics, Depressives, Hysterics and Neurasthenics.

(b) An Information score far below the Vocabulary level is most characteristic for Involutional Depressives, Chronic Paranoid Schizophrenics, and Hysterics. The first two of these groups however suffer a general impairment of Verbal scores; but the general Verbal level of the Hysterics is well-retained, and the impairment of Information is thus outstanding.

(c) A good Information (and Vocabulary) score, associated with impairment on other Verbal subtests, is characteristic of the Unclassified Schizophrenics and the Obsessive-Compulsives. Such a pattern may also be present in Psychotic Depressives.

(d) High weighted Information scores are most characteristic of the Well-Adjusted Normals and, among the clinical groups, the "intellectualizing" Obsessive-Compulsives and Over-Ideational Preschizophrenics. Such high scores are rare or absent in Psychotic Depressions and in Hysterics.

H. SIMILARITIES

1. Introduction. The Similarities subtest of the Bellevue Scale consists of 12 items.[52] It will be maintained here that successful performance on these items implies *verbal concept formation.* Responses on a high conceptual level merit a raw score of two, those on a lower conceptual level a score of one, and failures a score of zero. The sum of the raw scores thus obtained is translated into a weighted score with the help of the Weighted Score Table of the Bellevue Manual.[53] The Similarities subtest belongs to the group of essentially Verbal subtests. Special Table 3 (See page 84) shows that the Similarities subtest has as high an average score for our total population as Vocabulary; but has a greater variability, indicated by a higher standard deviation. As we shall see, it stands somewhere between Information and Comprehension as far as its vulnerability is concerned; and consequently it is diagnostically very significant, showing neither a generalized impairment nor a general refractoriness to impairment.

---

[52] The test problem is to state in what way the following are similar or the same: (1) orange—banana; (2) coat—dress; (3) dog—lion; (4) wagon—bicycle; (5) daily paper—radio; (6) air—water; (7) wood—alcohol; (8) eye—ear; (9) egg—seed; (10) poem—statue; (11) praise—punishment; (12) fly—tree.

The Similarities subtest is also one of the three concept formation tests of our battery, and will be dealt with again in the section on Diagnostic Concept Formation Testing. It is necessary, however, to present here some considerations concerning concept formation by way of introducing the Similarities subtest.

2. The Psychological Rationale of the Similarities Subtest. We shall consider the psychological processes of verbal concept formation underlying responses to the Similarities subtest, and advance some reasons for and some consequence of so doing. The general discussion of the psychology of concept formation will be found in Part II of this volume.

Concept formation is the function which informs the human being about the "belonging together" of the objects and events of his every-day world. Each word with which one names an object implies an automatic concept formation, a placing of the object where it "belongs" in one's world. Every percept—insofar as it is "apperceived", and not considered merely a physiological process—implies concept formation, because to identify anything implies determining where it "belongs". Consequently every thought process, the most simple and the most complicated, implies concept formation—in the sense that our looking upon, and mode of discerning, thought processes is such that concept formation always appears to be one aspect of them. Concept formation as a conscious, voluntary, effortful process is experienced in all systematic scientific endeavor; but even here it may occur in an automatic, effortless manner in the form of "hunches", "experience", and so on. In everyday thought processes, where not too much of the unknown or the emotionally difficult is encountered, concept formation is mainly automatic and effortless. Affective orientations and attitudes build the world of the individual—that is, structure it in patterns of conceptual coherence, into which he organizes new experience automatically when the patterns are not disrupted by the encroachment of maladjustment. Symbolism and physiognomic characters[5] are the most

[53] See Wechsler (28), page 182.

[54] See H. Werner (31), Chapter IX.

primitive conceptual coherence patterns, and here the affective nature of conceptual organization is clearly perceptible. Symbols, physiognomic impressions, and all those patterns of "belonging together" and "meaning" which are characteristic of the "unconscious",[55] are organized around affects. The development of conscious thinking, however, tends to replace these idiosyncratic, affective conceptual organizations by verbal, abstract, and communicable ones, common to the social group and tuned to reality. Yet this process of replacement never exorcises the idiosyncratic, affective origin of conceptualization. The assumption that concepts are commonly accepted is shattered when one puts questions like those of the Similarities subtest to many "normal" subjects, or inquires—as in the Sorting Test, to be discussed later—which of a set of objects these "normals" would consider as "belonging together".

Concept formation is one of the aspects of every thought process, and experience shows that it is one of the main channels through which maladjustment encroaches upon intellection. To state this in more "operational" terms, the effect of maladjustment on intellection can be discovered earlier in concept formation than in other aspects of thought processes. In *verbal* concept formation, however, impairment may remain disguised, for reasons soon to be seen.

The pairs of objects whose similarity must be conceived are to be each considered as constituting a conceptual *realm*, the conceptual content[56] of which must be discovered and stated. There are several qualitatively different levels of concept formation on which the content of these realms can be defined. We shall distinguish here only three: the concrete, the functional, and the conceptual.

Let us take, for instance, the pair *dog—lion*. A subject whose thinking is entirely concrete and who is unable to make abstractions, and the subject for whom *lion* is merely a carrier of threatening physiognomic quality, will refuse to answer the test question, stating that the two are not similar. In subjects who are concretistic, though not to this extreme, the responses state that dogs and lions are similar because both have legs, or tails, or hair. Here concrete detail is taken as the content of the realm, although such details are inessential if we deal with concepts of any complexity.[57] In this response, a great number of common concrete features of dogs and lions are neglected, and not even a complete enumeration of all such details would "cover" or communicate the concept. Besides being too limited, a concrete definition is also too inclusive: tables too have legs, humans have hair, and so on. As a matter of fact, the concrete definition in some cases may be pathologically inclusive, as in the response that dogs and lions are similar because both have cells. Such generalization is characteristic of schizophrenic conceptualization. Concrete definitions are therefore inadequate.

---

[55] For unconscious or primary processes and their mechanisms see Freud: Interpretation of Dreams (9), Chapter VII, Parts E and F.

[56] For a detailed definition of the terms *realm* and *content* of concepts see page 389. The "realm" is all the objects to which the concept pertains (e.g., all tables); the "content" is what all the objects of the "realm" have in common (the table-ness).

[57] The degree to which a concrete detail can become the essential content of a concept is necessarily relative. Thus, for a statistician persons may become differentiated merely in terms of income tax blanks—for him a very concrete and single characteristic. If he attempts to use this criterion outside of his office ("every inch a statistician") he will inevitably be dubbed "queer".

Another way to define the similarity of a pair such as *wagon—bicycle* is to say, "You ride them both." This definition refers to a function of the objects: that they have other functions, and conceptually more general characteristics, is not taken into consideration by such a definition. Although it is possible in some cases for a functional concept to be completely adequate, in general it will be partial and not exhaustive.

A third way to define the similarity of dogs and lions is to say that both are animals. This is the abstract-conceptual level of concept formation: that is, the subsuming of items of the realm in question under a general term, the complex content of which is so clearly defined that it is the common treasure of our vocabulary and thinking. Yet not even on this level is there an unequivocally specific answer to the question, "How are they similar?" The responses "mammals", "quadrupeds", "carnivora" are just as much on the abstract-conceptual level as is "animals". In other words, a degree of freedom is present in concept formation in the Similarities subtest. The response "animals" is a relatively lax one, but implies common-sense; the responses "mammals" and "carnivora" may imply sophistication, ostentatious show of information issuing from feelings of inferiority, or overmeticulousness issuing from doubt; but each is within the "normal" limits, and may serve to indicate character trends rather than the presence of maladjustment.

A cursory survey shows that the norms Wechsler gives for scoring the Similarities items—in other words, the enumeration of what type of response should be scored 2, 1, or 0—follow in general the sequence conceptual, functional, and concrete level; though not infrequently some concretistic responses will obtain a score of 1, and some functional definitions will obtain a score of 2. As scoring norms are established by statistical frequency, we may look upon this sequence of scores as evidence in support of our theoretical differentiation of conceptualization into these three levels. The exceptions to the sequence of scores may be considered as the statistical reflection partly of the difficulty of some of the Similarities items, and partly of the fact that abstract-conceptual level of concept formation is the ideal rather than the general rule for the cross-section of the population.

No one of these levels alone dominates a test. Even though one or another level may predominate, the more difficult a question becomes and the less firmly established the subject's level of concept formation is—or the more maladjustment has weakened an established abstract-conceptual level—the more frequently do we find functional and concretistic responses cropping up. The examiner sometimes obtains, to the *dog—lion* pair, such a response as, "They are four-legged, mammalian, carnivorous animals covered with hair." Such definitions not only are redundant, but also show that on the abstract-conceptual level functional and concrete concepts survive and are relied upon, presumably because confidence in the abstract concept is absent. The compulsive meticulousness of such definitions is essentially the expression of the weakening of the abstractive and generalizing abilities of the subject, and points up the presence of pathological doubt, vacillation, and indecision in the clinical picture of the subject.

Where responses are obtained to the Similarities items, the verbalization and content can be scrutinized and understood. But where the items are flatly failed ("I don't know", or "They are not similar"), the basis of the failure must be inferred partly from the specific nature of the item and partly from the general level of conceptualization manifested in the other responses. To give a foundation for such inferences, we shall discuss some characteristics of the 12 Similarities items.

There are considerable differences between the conceptual demands made by each of the 12 Similarities items. For instance, *orange—banana*, *coat—dress*, *dog—lion* are pairs to which the abstract-conceptual responses have become a verbal convention. But the similarity of *air—water* or *egg—seed* must be more or less inferred on the basis of information; while those of *wood—alcohol*, *praise—punishment*, and *fly—tree* require information and/or a considerable degree of ability for abstraction.

First, it will be obvious that such relations as *orange—banana: fruit* and *dog—lion: animal* have achieved such a degree of "verbal coherence" or conventionalization, that these abstract-conceptual responses are not sufficient evidence of a high level of concept formation. In fact, these responses may survive as empty shells even though concept formation is disorganized. As in Comprehension, so in Similarities verbalization has the tendency to survive the function that created it; thus, the examiner must be cautious, because in *all* Similarities responses he may be dealing with a well-retained front covering a disorganized function.

Secondly, where such items, conceptual response to which has become verbal convention, are answered on a functional or concrete level, either original poverty of concept formation or impairment of verbal concepts due to maladjustment is present.

Thirdly, some of the items can be acceptably responded to on a functional level (as *orange—banana: You eat both; coat—dress: You wear both*); but a functional response to others (*egg—seed: You eat both*) cannot obtain a passing score. Similarly with concretistic responses: *orange—banana: peels*, is scored as passing; but *egg—seed: round*, is not. Thus, such failures on items should be understood as evidence of the subject's clinging to either a functional or a concrete level.

The differences between the conceptual demands of the Similarities items may be illustrated by other instances. It is rather easy to respond to *wood—alcohol* on a functional level: *they burn*. It is not so easy to give an acceptable answer on a functional level to *praise—punishment*. Here the response *methods of discipline* or *motivations* can hardly be replaced by adequate functional descriptions, and a concretistic definition is altogether unacceptable. It is possible to give an acceptable concretistic response to *coat—dress: they are made from cloth;* but it is almost impossible to give one to *poem—statue*. The examiner accordingly should try to see what type of response a subject gives to the items he passes, in order to infer the reason for his failures. Subjects who get by with concretistic definitions will fall down on items where such definitions are difficult or impossible. An analysis of the responses from this point of view is quite fruitful, and gives a qualitative understanding of the nature of the patient's verbal concept formation.

It should be re-emphasized that the Similarities subtest refers to verbal concepts and can be responded to merely by virtue of verbal convention, and on several levels of conceptualization. Thus it is understandable that in general Similarities will keep up in spite of maladjustment, even though other forms of concept formation may have already become impaired.

3. *Administration*. A few points of administration of the Similarities subtest not enlarged upon in the Bellevue Manual will be taken up here.

(a) Subjects who state that they do not know the answer to an item should be encouraged to think about it longer, but should not be pressed unreasonably hard. In cases where the other subtests or other Similarities items show "queernesses", however, we usually insist upon the subject's making a response, because these are the very points where material revealing pathology usually appears.

(b) Subjects who give differences instead of similarities must be held to giving a response in terms of similarities. Adults who are *not able* to understand that the question is one of similarities are usually feebleminded, and those who *refuse* to give similarities are likely to be psychotic.

(c) If a subject states there is no similarity, caution is in place; negativism or projective-paranoid trends may be thus indicated. Our practice is to explain to the subject directly that our asking for a similarity implies that similarities exist.

(d) Every examiner meets subjects who insist on pinning the examiner down to "just what he means by similarities". We consistently refuse to give any explanation on this point, assuming from experience that the question is clearly understood by these subjects and that the inquiry is an expression of doubt and/or suspiciousness.

(e) When a subject gives several responses at once—especially if these responses are of varying importance, and on varying conceptual levels—we usually ask the subject to indicate the essential similarity. This becomes the basis of our scoring, and we lessen the score only if some of the other alternatives are decidedly poor.

Here again it cannot be overemphasized that verbatim recording of the total verbalization of the subject for every item is important, because frequently the examiner must fall back upon the verbalizations in order to be able properly to evaluate the subject's total achievement on verbal concepts.

4. Item Analysis of the Similarities Subtest. In Section 2 it was mentioned that clinical experience suggests a division of the 12 Similarities items into three subgroups, according to the degree of conventionality of the correct response, the degree of specific information implied, and the degree of abstract conceptualizing ability required. To obtain a statistical substantiation of this clinical experience, we analyzed the Similarities responses of the Patrol. We found that items 1, 2, 3, 4, 5, and 8[58] are least frequently missed by the Patrol: out of 324 chances only 4 failures occurred (1%). Items 6, 9, and 10[59] were failed by the Patrol in only 22% of the chances; but items 7, 11, and 12[60] were missed by them in 62% of the chances. We accordingly divided the Similarities items into these three groups, and present here a statistical and graphical analysis of the failures of our clinical groups on each of the three.

Figure 14 represents the frequency of failures on the three groups of items in all the clinical and control groups. The graph shows that the division of the items into these three degrees of difficulty holds true for all our groups, inasmuch as in the general trends represented there is no overlapping and the three graphlines are clearly discrete. The graphline representing the percentage of misses on the six easy items shows that one or more—or at least 16%—of such misses is most likely to be present in Depressive Psychoses, and Unclassified Deteriorated and Simple Schizophrenias; that Neurotics and Normals are not likely to have more than a stray miss; and that the Depressive Neurotics, though having slightly more misses than the Normals and Neurotics, have much fewer than the Depressive Psychotics. The graphline repre-

---

[58] Group 1: 1. Orange—banana. 2. Coat—dress. 3. Dog—lion. 4. Wagon—bicycle. 5. Daily paper—radio. 8. Eye—ear.

[59] Group 2: 6. Air—water. 9. Egg—seed. 10. Poem—statue.

[60] Group 3: 7. Wood—alcohol. 11. Praise—punishment. 12. Fly—tree.

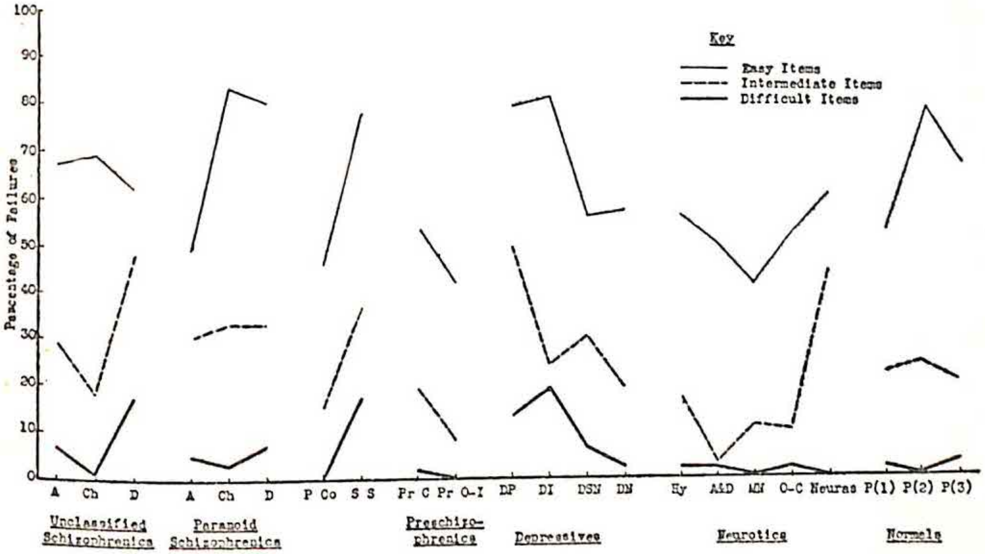


FIG. 14.—ITEM ANALYSIS OF THE SIMILARITIES SUBTEST
Percentage of Items Failed at Each of the Three Degrees of Difficulty

TABLE 24-A.—*Percentage of Misses on Similarities Items of 3 Levels of Difficulty*

Group	No. of Cases	Percentage of Misses on:		
		Easy	Intermediate	Difficult
(P + U) Sch.	63	6	22	62
DP + DI.	15	16	38	80
DSN.	9	6	30	56
DN.	7	2	19	57
Neurotics.	59	1	15	52
Patrol.	54	1	22	62
P Co.	13	0	15	46
S S.	9	17	37	78
Pr C.	16	2	19	54
Pr OI.	16	0	8	42

senting the percentage of misses on items of second degree of difficulty shows that such misses are most likely to occur in the Deteriorated Unclassified Schizophrenic, Depressive Psychotic, and Neurasthenic groups; that they are least likely to occur in the Neurotic groups, excepting the Neurasthenic, and in the Over-Ideational Preschizophrenics; and that—probably because of inferior cultural background—the Patrol misses more than the Neurotics, and about the same as the better Schizophrenics and Depressives. The graphline representing the percentage of misses on the difficult items is not sharply differentiating: the Neurotics, Depressive Neurotics and Preschizophrenics still do well; and the Simple, the Paranoid Chronic and Deteriorated Schizophrenics, and the Depressive Psychotics do worst. However, the Borderline-Adjusted Patrol does about as poorly as these groups, which again indicates the cultural weakness.

TABLE 24-B.—*Differential Significance of Percentage of Misses on Easy Items*

Groups Compared	Chi²(d.f. = 1)	Significance
(P + U) Sch : (DP + DI)	8.38	<1%
(P + U) Sch : Neurotics	8.79	<1%
(P + U) Sch : Patrol	9.04	<1%
(DP + DI) : Neurotics	31.67	<<<1%
(DP + DI) : Patrol	31.38	<<<1%
DSN : Neurotics	2.31	10–20%
DSN : Patrol	2.67	10%
S S : Neurotics	28.46	<<<1%
S S : Patrol	28.71	<<<1%

TABLE 25-A.—*Percentage of Cases with One or More Misses on Easy Items*

Group	No. of Cases	% who missed
(P + U) Sch	63	24
DP + DI	15	60
DSN	9	33
DN	7	14
Neurotics	59	7
Patrol	54	6
P Co	13	0
S S	9	44
Pr C	16	6
Pr OI	0	0

Tables 24 and 25 present the statistical evaluation of the data represented by the graph. Table 24 treats the data in terms of percentage of failures, while Table 25 treats them in terms of cases failing one or more items. Both analyses show parallel results. The outstanding group differences indicated in Figure 14 are all statistically significant. The Depressive Psychotics and Simple Schizophrenics have significantly more failures and significantly more cases failing than any other groups. The combined Schizophrenics, although they fail significantly fewer items than the Depressive

Psychotics and Simple Schizophrenics, still fail significantly more items than the Neurotics or the Patrol. It is of both theoretical and diagnostic import that the extent of impairment of verbal concepts is parallel to the severity of the depression; this is shown by the finding that, while the Depressive Psychotics are significantly more impaired than the Neurotics and Patrol, the Severe Neurotic Depressives show only a trend to miss more than, and the Neurotic Depressives do no better or worse than, the Neurotics or Patrol.

We conclude that the examiner must pay special attention to failures on the easy items; that such failures are to be expected especially in the Depressive Psychotics and Simple Schizophrenics; that they occur to a lesser extent in the Unclassified and Paranoid Schizophrenics, as well as in the Severe Neurotic Depressives; and that the remaining clinical groups and the control group have few or no such failures.

TABLE 25-B.—*Differential Significance of Percentage of Cases*

Groups Compared	Chi^2(d.f. = 1)	Significance
(P + U) Sch : (DP + DI)	5.85	1–2%
(P + U) Sch : Neurotics	5.49	1–2%
(P + U) Sch : Patrol	6.11	1–2%
(DP + DI) : Neurotics	19.86	<<1%
(DP + DI) : Patrol	20.58	<<1%
DSN : Neurotics	3.43	5–10%
DSN : Patrol	4.06	2–5%
S S : Neurotics	7.35	<1%
S S : Patrol	8.20	<1%

Additional information is obtained if one considers in each group the item which shows the greatest frequency of failures. We found that in the easy group it is item No. 8 (*eye—ear*); in the intermediate group item No. 6 (*air—water*); and in the difficult group item No. 11 (*praise—punishment*). The examiner should keep these in mind, and even in passing responses should look for the subject's difficulties in answering them. The difficulty with all three items is that though the terms are only too well-known to the subject, their similarity lies on a quite abstract level. Thus the subject is usually tempted to describe them, or to deny their similarity by pointing out their differences. The theoretical import of this point is that it is not unknown to these subjects that *eye* and *ear* are parts of the body or organism, and it is not usually a lack of knowledge that underlies failure, but rather the difficulty of achieving an adequate generalization. It is true that in *air—water* proper information can be—at least theoretically—helpful, and subjects frequently will say that "both have hydrogen", in an effort to replace their inadequacy of conceptualization by equally inadequate information. Persons of great intelligence and wealth of information will sometimes state, "They both have oxygen, but that cannot be the similarity between them. That cannot be what you want." The most obvious and simple response, "Both are necessities of life", is known to all but unavailable to most subjects because the way to it lies in proper abstract conceptual analysis. Concept formation is thus not simply a matter of information or of good logic. Information may be present, and yet the proper conceptual response may still not be obtained; logic may be operating, and yet be errant if the point to which it is applied is not correctly chosen. Passing responses to Similarities are dependent either upon well-automatized verbal convention or, where the items are more difficult, upon an appropriate organization of attitudes which, in turn, organize the available information and conceptual coherence patterns in the most economic[61] way.

Thus, concept formation is based on something which transcends formal information and formal logic. Since the item analysis shows that it is not a lack of information or of logic that is the basis of failures and low scores on Similarities, the examiner can with assurance conclude that, if failures occur, there is a disturbance of the automatic balance in thought processes which allows for good mobilization of attitudes summoning up information and logic in an "appropriate" manner; and that maladjustment is encroaching upon concept formation. This is the true diagnostic significance of verbal concept formation, though the examiner must remember that impaired concept formation may be disguised by verbal convention.

5. Vocabulary and Mean Scatter: "t"-Test.

The position of the Similarities subtest among the other subtests can be appraised first by considering that, of all the subtests, it shows the highest correlation with Comprehension and Information.[62] Further information in this regard is gained from the comparison of the Vocabulary Scatter of Similarities with that of other subtests. We have charted the average Vocabulary Scatter of Similarities of all our groups, clinical and control, on Graph 2 of Special Figure 1, together with those of Digit Span and Arithmetic. The comparison of Similarities with these other subtests shows its tendency not to drop below the Vocabulary level, and even to show a positive Vocabulary Scatter in many of the groups. Comparison of the Similarities graph with those of Information and Comprehension, represented in Graph 1 of Special Figure 1, shows that Similarities tends to depart from the Vocabulary level—the base line of these graphs—somewhat more, in both positive and negative directions, than does Information; but tends to depart less than Comprehension in the negative direction. A survey of the rest of the graphs shows that Information, Similarities, and Comprehension tend to cluster closer to the Vocabulary level—that is, to show less scatter—than the Performance subtests. Whether this difference of Performance and Verbal subtests is due to the greater complexity and thus greater vulnerability of the Performance subtests, or to the tendency of verbal achievements to survive even as empty shells, or to both, cannot as yet be determined.

---

[61] The expression "economic" here refers to the balance a subject must strike between concretistically narrow and loosely wide concepts in establishing the *appropriate* conceptual content.

[62] See Wechsler (28), page 215, Table 42.

Diagnostically, the graph shows that a tendency to have a negative Vocabulary Scatter of Similarities is greatest in the Deteriorated Schizophrenics, in the Chronic Paranoid Schizophrenics, and in the Depressive Psychotics. Lesser negative Vocabulary Scatter is present in the other Unclassified Schizophrenics and, among the Neurotic groups, only in the Obsessive-Compulsives—who, as we have seen earlier, show up in many respects like Schizophrenics. Great positive Vocabulary Scatter appears to be characteristic for the Severe Neurotic Depressives, Mixed Neurotics, and the Anxiety and Depression group. It is worth noting here the diagnostic discrepancy between the negative scatter of the Psychotic, and the positive scatter of the Neurotic, Depressions. The tendency of the Anxiety and Depression group to have high Verbal scores, and to show up like the Neurotic Depressions, has previously been noted.

The Patrol shows up as it did in the item-analysis, displaying the effects of its cultural background by a mild negative Vocabulary Scatter. Comparison of this negative Vocabulary Scatter to the Patrol's positive Vocabulary Scatter on Information and Comprehension shows that, more than either of these subtests or Vocabulary, Similarities is a sensitive indicator of poverty of cultural background.

For a statistical appraisal of the significance of the Vocabulary Scatter of Similarities in the different groups, we turn to Special Table 1 (Page 79). The most striking datum in the Similarities column is that only one group, the Chronic Paranoid Schizophrenics, shows a significant tendency to have a Similarities score below its Vocabulary score. This attests to the relative stability of this verbal function. There are groups—the two Deteriorated Schizophrenics and the Involutional Depressives—which have a negative Vocabulary Scatter of Similarities greater than that of the Chronic Paranoid Schizophrenics; but the variability within these groups, which are all relatively small in number, is sufficient to minimize the significance of this finding. The Chronic Paranoid Schizophrenics apparently show a case-to-case consistency in impairment of verbal concepts. The trend toward increasing impairment of verbal concepts, associated with chronicity and deterioration in the Paranoid Schizophrenics, is indicated by the fact that the average Similarities score of the Acute Paranoid Schizophrenics hardly differs from their Vocabulary level (Vocabulary Scatter = −.2); the Chronic Paranoid Schizophrenics show a consistent but mild impairment (Vocabulary Scatter = −1.2); and the Deteriorated Paranoid Schizophrenics have the greatest average impairment of verbal concepts (Vocabulary Scatter = −2.0). Such a finding is of diagnostic importance, since it helps to differentiate between Chronic and Deteriorated Paranoid Schizophrenics on the one hand, and Acute Paranoid Schizophrenics and Paranoid Conditions on the other. It has theoretical importance also, inasmuch as such a consistent progression of impairment is found neither in verbal concepts of Unclassified Schizophrenics, nor in the Information and Comprehension subtests of the Paranoid Schizophrenics. It appears then that the organization of the patient's world in terms of "belongingness" is more encroached upon by the paranoid schizophrenic process than by schizophrenic processes of other shadings. This may be considered to be consistent with the clinical nature of paranoid disorders.

It is noteworthy that of all the Neurotics, the only group which has a trend toward impairment of verbal concepts is the Obsessive-Compulsive; in fact, the remaining groups all have Similarities averages above the Vocabulary average. It is further noteworthy that the Borderline-Adjusted Patrol has a negative Vocabulary Scatter of some significance. It has already been seen in the analysis of the Vocabulary subtest that this group suffers some impairment of verbal functions: there the influence of precarious adjustment upon a culturally unsupported function was emphasized.

The Similarities column in Special Table 1 also gives a clue toward the differentiation of Depressive Neuroses and Psychoses: both the Psychotic and Involutional Depressives have negative Vocabulary Scatter, while the Depressive Neuroses have a positive Vocabulary Scatter. A special "Student's t"-test of the difference in Vocabulary Scatter between the Psychotic and Neurotic groups yielded a "t" of 2.18, which is significant on a 2% to 5% level. In other words, there is a significant tendency for the Depressive Neurotics to do better on the Similarities subtest than the Depressive Psychotics. These results may be compared with those represented in Special Table 2, which gives the averages and the significance of the Mean Scatter of the different subtests for all the clinical and control groups. It is seen that no Schizophrenic group, not even the Chronic Paranoid Schizophrenics, has a Similarities score significantly lower than its Verbal Mean: this reflects, first, the fact—discussed in the section on Major Scatter Patterns—that the Schizophrenics in general tend to have an impairment of all verbal functions; and, second, that as Similarities is in general less resistant to impairment than is Vocabulary, the impairment of verbal concepts in Schizophrenics may best be estimated from the Vocabulary level. To a lesser extent this appears to be true for the Obsessive-Compulsives, a group which we have repeatedly seen to follow, in some degree, the Schizophrenic pattern of scatter.

On the other hand, the Borderline-Adjusted Patrol, which had only a mild tendency to fall below the Vocabulary level on Similarities, shows in Special Table 2 a significant tendency to have a negative Mean Scatter of Similarities. In the section on Major Scatter Patterns we saw that the Patrol in general has a good harmony of efficiency of all verbal functions, including Vocabulary. It becomes clear, however, that verbal concepts in these Normals are especially vulnerable to impairment; even the Well-Adjusted Patrol shows a trend toward a relative inefficiency of verbal concept formation, in comparison to other verbal functions. This trend in the Patrol is presumably referable to the cultural factor, and will appear in the other concept formation tests also.

The Depressive Neuroses again are to an extent differentiated from the Depressive Psychoses: the former show a tendency to have a positive Mean Scatter of Similarities; the latter do not. The Neurotics, with the exception of the Obsessive-Compulsives, show more or less a tendency to have a well-retained Similarities score.

6. Vocabulary Scatter: Chi² Test. Let us now turn our attention to the analysis of a percentage distribution of cases in every group into ranges of Vocabulary Scatter. This is the distribution which actually determines the diagnostic usefulness of the tendencies indicated by the averages.

Tables 26-A, 26-B, and 26-C present these distributions and their differential significance. These tables show that the frequency of occurrence of a Similarities score 3 or more weighted score-units below the Vocabulary level is significantly great-

TABLE 26-A.—VOCABULARY SCATTER OF SIMILARITIES. *Percentage of Cases in Ranges of Scatter*

Group	No. of Cases	≧ +2	+1 to 0	−1 to −2	−3 to −4	≦ −5
U Sch A	17	12	35	35	6	12
U Sch Ch	13	23	23	46	8	—
U Sch D	7	29	—	29	29	13
P Sch A	11	45	9	28	—	18
P Sch Ch	10	10	10	60	20	—
P Sch D	5	20	20	—	20	40
P Co	13	31	23	38	8	—
S S	9	22	34	11	33	—
Pr C	16	31	44	19	6	—
Pr OI	16	31	31	19	19	—
DP	8	12	38	25	12	12
DI	7	13	29	—	29	29
DSN	9	22	56	22	—	—
DN	7	13	74	13	—	—
Hy	18	28	38	28	6	—
A & D	10	40	40	20	—	—
MN	9	78	11	—	11	—
O-C	16	19	25	44	6	6
Neuras	6	17	66	—	17	—
P (1)	32	9	50	28	13	—
P (2)	17	12	35	35	18	—
P (3)	5	20	60	20	—	—

TABLE 26-B.—*Special Summary. Number of Cases that Drop 3 or More*

Special Groups	(≦ −3)	% of Group
U Sch + P Sch	14	22.2
DP + DI	6	40.0
DSN + DN	0	0
Neurotics	5	8.5
Patrol	7	13.0

est in the Depressive Psychotics. The Depressive Neurotics have not one case with such an extreme scatter. This re-emphasizes the finding of Special Figure 1, Graph (2), according to which the Vocabulary Scatter of Similarities differentiates Neurotic from Psychotic Depressions.

The Schizophrenics are the second worst group in this respect, and are more significantly differentiated from the Neurotics than from our Normals. The explanation of this seemingly paradoxical result is seen in Tables 26-D and 26-E, which show that only 11% of our Normals are capable of achieving relatively superior Similarities scores, while 40% of the Neurotics are capable of so doing. This is further proof of the relatively poor conceptual development of the Patrol.

We conclude that extreme Vocabulary Scatter of Similarities is found greatest in Depressive Psychoses; the absence of such scatter in the Depressive Neuroses helps to establish the differential diagnosis between these two groups. Such extreme scatter is also present, though to a lesser extent, in the Schizophrenics. The Normals and the Neurotics tend to have few such cases, although the Normals because of their cultural background do less well than the Neurotics.

TABLE 26-C.—*Differential Significance of Percentage of Cases* ≤ -3

Groups Compared	Chi²(d.f. = 1)	Significance
(P + U) Sch : (DP + DI)	1.18	20–30%
(P + U) Sch : Neurotics	3.40	5–10%
(P + U) Sch : Patrol	1.12	20–30%
(DP + DI) : (DSN + DN)	5.58	1–2%
(DP + DI) : Neurotics	7.07	<1%
(DP + DI) : Patrol	3.98	2–5%

TABLE 26-D.—*Special Summary*

Group	No. of Cases $\geq +2$	% of Group
Neurotics	20	39.9
Patrol	6	11.1

TABLE 26-E.—*Differential Significance of % of Cases* $\geq +2$

Groups Compared	Chi²(d.f. = 1)	Significance
Neurotics : Patrol	7.03	<1%

7. *Modified Mean Scatter: Chi² Test.*

Another test of the distribution of high and low scatter is obtained by analyzing the Modified Mean Scatter of Similarities.

Table 27 presents the percentage of cases falling into the great positive, great negative, and intermediate ranges of Modified Mean Scatter. The differences in distribution obtained in using this scatter measure are less than those obtained in using Vocabulary Scatter, but the trends remain the same: the greatest impairment of Similarities below the level of the other Verbal scores occurs in the Depressive Psychotics and Simple Schizophrenics; these groups are followed by the combined Schizophrenics and the Obsessive-Compulsives, who here again follow the Schizophrenic pattern; and the Patrol, as in the case of Vocabulary Scatter, is worse than the Neurotics and the Depressive Neurotics. The superior differential diagnostic efficiency of Vocabulary Scatter of Similarities as compared to its Modified Mean Scatter is apparent in the comparison of Special Tables 1 and 2. Such a discrepancy of efficiency was to be expected, in view of the great stability of Vocabulary and its refractoriness to impairment, compared to the other Verbal subtests. Vocabulary then remains the best standard from which to estimate impairment of verbal concepts. Table 27-C presents the comparison between the Modified Mean Scatter of the Patrol and the Neurotics, similar to the comparison with regard to the Vocabulary Scatter of Similarities in Table 26 above. The results are the same: the achievement of relatively superior Similarities scores is significantly less, as compared to the other Verbal scores, in the Patrol than in the Neurotics. The difference in cultural background is again emphasized here.

TABLE 27-A.—MODIFIED MEAN SCATTER OF SIMILARITIES. *Percentage of Cases in 3 Ranges of Scatter*

Group	No. of Cases	$\leqq -2$	$-2 < X < +2$	$\geqq +2$
P Sch + U Sch	67	27	56	18
S S	9	44	44	11
(DP + DI)	15	40	27	33
(DSN + DN)	16	7	47	47
Neurotics	59	15	58	27
O-C	16	25	56	19
Neurotics—O-C	43	11	58	30
Patrol	54	15	82	4
(P Co + Pr C + Pr OI)	45	9	71	20

It is of interest to examine the extreme values of Modified Mean Scatter of Similarities, presented in Table 28. If we take as the limit a Similarities score 4 or more units below the Modified Verbal Mean, 4 Schizophrenics, 3 Depressive Psychotics, and only 1 Neurasthenic are caught on this level. If we lower the limit to Modified Mean Scatter *less than or equal to* 3, 11 Schizophrenics, 4 Depressive Psychotics, 4 Neurotics, and 2 Normals are caught. Clearly the predominance of high negative Modified Mean Scatter for Similarities occurs in the psychotic groups. Preschizophrenics and Depressive Neurotics are not at all represented.

If, at the other extreme, we take as a limit a Similarities score 4 or more units above

TABLE 27-B.—*Differential Significance of Distribution of Cases*

Groups Compared	Chi²(d.f. = 2)	Significance
(P + U) Sch : (DP + DI)	.46	50%
(P + U) Sch : (Neurotics—O-C)	2.79	5–10%
(P + U) Sch : Patrol	1.89	10–20%
(P + U) Sch : (P Co + Pr C + Pr OI)	4.39	2–5%
S S : (Neurotics—O-C)	3.54	5–10%
S S : Patrol	2.68	10%
(DP + DI) : (DSN + DN)	3.30	5–10%
(DP + DI) : (Neurotics—O-C)	4.12	2–5%
(DP + DI) : Patrol	3.18	5–10%
O-C : (Neurotics—O-C)	.74	30–50%
O-C : Patrol	.33	50–70%

TABLE 27-C.—*Differential Significance of % of Cases ≧+2*

Groups Compared	Chi²(d.f. = 1)	Significance
Patrol : Neurotics	9.86	<1%
Patrol : (Neurotics—O-C)	8.99	<1%

TABLE 28.—*Frequency of Extreme M.M.S. on Similarities*

Part I

Great Positive M.M.S.

Group	≧ +3	≧ +4
U Sch A	2	1
U Sch Ch	2	1
U Sch D	2	—
P Sch A	2	2
Sch D	1	—
Co	3	2
r OI	2	—
P	1	—
I	1	1
SN	1	1
y	2	—
& D	2	—
(3)	1	1

Part II

Great Negative M.M.S.

Group	≦ −3	< −4
U Sch A	1	1
U Sch D	1	—
P Sch A	3	—
P Sch Ch	1	—
P Sch D	3	1
S S	2	2
DP	1	1
DI	3	2
MN	1	—
O-C	2	—
Neuras	1	1
P (1)	2	—

the Modified Verbal Mean, 9 cases are caught, 4 of which are Acute Paranoid cases (2 Acute Paranoid Schizophrenics, 2 Paranoid Conditions). If the limit is set at *greater than or equal to* 3, 9 such Acute Paranoid cases are included, or 37% of these two groups. Such good retention of verbal concepts in Acute Paranoid disorders has already been seen in Graph 2 of Special Figure 1, where of all the psychotic groups only the Acute Paranoid Schizophrenics and Paranoid Conditions showed a positive Similarities scatter. This scatter pattern is frequently important in differentiating Acute from Chronic Paranoid Schizophrenics.

TABLE 29-A.—*Frequency of High Weighted Scores on Similarities*

Group	Cases with 14, 15, 16 or 17		Cases with 15, 16 or 17	
	No.	Per cent	No.	Per cent
U Sch A	5	29	2	12
U Sch Ch	6	46	1	8
U Sch D	1	14	—	—
P Sch A	4	36	1	9
P Sch Ch	1	10	—	—
P Sch D	—	—	—	—
P Co	7	54	3	23
S S	—	—	—	—
Pr Co	6	38	2	12
Pr OI	12	75	10	62
DP	1	13	—	—
DI	—	—	—	—
DSN	3	33	2	22
DN	3	43	—	—
Hy	8	44	3	17
A & D	7	70	3	30
MN	6	66	4	44
O-C	6	38	3	19
Neuras	2	33	—	—
Patrol (1)	12	38	2	6
Patrol (2)	1	6	1	6
Patrol (3)	1	20	1	20
Special Groups:				
(P + U) Sch	17	27		
P Co + Pr OI	19	66		
DP + DI	1	7		
DSN + DN	6	38		
Neurotics	29	49		

8. Analysis of the Extreme Weighted Scores of the Similarities Subtest.

Let us now inspect the extremely high and extremely low weighted scores and their frequency in all the clinical and control groups. Special Figure 2 (page 83) presents all instances of weighted scores below 6 on all subtests. In regard to Similarities, this graph is remarkable in two respects. (a) It shows that only Information and Comprehension have a comparably low number of cases with such extreme low weighted scores. Similarities takes a middle position between these two. Thus we have again a demonstration of the validity of the relationship of Similarities to Comprehension and to Information. (b) Of the 5 cases which have such low Similarities scores, 2 are in the Psychotic Depressive group. This is in harmony with earlier considerations regarding the showing of Similarities in Depressive Psychoses. One of these cases is a Simple Schizophrenic. The remaining 2 cases are in the Acute and Deteriorated Unclassified Schizophrenic groups.

TABLE 29-B.—*Differential Significance of Frequency of High Weighted Scores* (≧14)

Groups Compared	Chi^2(d.f. = 1)	Significance
(P + U) Sch (A + Ch) : (P + U) Sch D	1.58	20%
(P Co + Pr OI) : (P + U) Sch	10.81	<<1%
(P Co + Pr OI) : Neurotics	1.49	20–30%
(DP + DI) : (DSN + DN)	2.63	11%
Neurotics : (P + U) Sch	5.47	2%
Neurotics : (DP + DI)	7.28	<1%
Neurotics : (DSN + DN)	.30	50–70%
Neurotics : Patrol (1)	.72	30–50%
Neurotics : Patrol (2)	8.61	<1%
Patrol (1) : Patrol (2)	4.19	2–5%

Table 29-A presents the frequency of high weighted Similarities scores in the different clinical and control groups, summarizing the number of cases who have scores of 15 and above as well as of those who have scores of 14 and above. It is remarkable, qualitatively, that no Deteriorated Paranoid Schizophrenic, no Simple Schizophrenic, and no Involutional Depressive has a score of 14 or above on Similarities; that in the Deteriorated Unclassified Schizophrenics, Chronic Paranoid Schizophrenics, Depressive Psychotics, and Maladjusted Patrol groups, only an occasional case has such a score. The quantitative relationships are summarized in the percentages of the major groups, where it is clearly shown that the Depressive Psychoses have the least percentage (7%) of cases with high Similarities scores. Next follows the Borderline-Adjusted Patrol (9%). It must be remembered that this Patrol group is of a poorer cultural background, and that their Similarities scores are further lowered by their precarious adjustment. Next follows the composite Schizophrenic group (27%), followed by the Depressive Neurotic group and the Well-Adjusted Patrol (38% each). The top scores are obtained by the Paranoid Conditions and Over-Ideational Preschizophrenics (66%) and next by the Neurotics (49%).

An inspection of Bellevue records of Normals of comparable intelligence and background to those of our Neurotics indicates that this percentage in the Neurotics is actually low; 100% of this comparable group of Normals has a Similarities score between 14–17. In general, the tests of significance presented in Table 29-B support the superiority of the Neurotics, Paranoid Conditions and Over-Ideational Preschizophrenics over the Schizophrenics, and especially over the Depressive Psychotics. The Borderline-Adjusted Patrol again shows up poorly in this respect.

We conclude that high weighted scores on Similarities are most likely to occur in Neurotics who have a good cultural background, and in patients given to "intellectualizing", such as the Paranoid Conditions and Over-Ideational Preschizophrenics. Such high weighted scores are almost completely absent in the Depressive Psychotics, Deteriorated Paranoid Schizophrenics, and precariously-adjusted Normals with a poor cultura background.

9. General Diagnostic Conclusions:

(a) Failures on the easy Similarities items are most widespread in the Depressive Psychotics and Simple Schizophrenics. To a lesser extent, these failures occur in the Unclassified and Paranoid Schizophrenics, and the Severe Neurotic Depressives. Few or no misses occur in Neurotics and Normals.

(b) Depressive Psychotics may be differentiated from Depressive Neurotics by their tendency to have impaired verbal concepts; the Similarities scores of the Depressive Psychotics run below their Vocabulary level and below their Verbal Mean.

(c) Chronic and Deteriorated Paranoid Schizophrenics may be likewise differentiated from the Acute Paranoid Schizophrenics and the Paranoid Conditions.

(d) Simple Schizophrenics, Obsessive-Compulsives and, to a lesser extent, precariously-adjusted Normals with a poor cultural background, also tend to have impaired verbal concepts.

(e) High weighted scores on Similarities are most likely to occur in Neurotics, in "intellectualizing" groups such as the Over-Ideational Preschizophrenics and Paranoid Conditions, and in Well-Adjusted Normals. High weighted scores are rare or absent in Depressive Psychotics, Deteriorated Paranoid Schizophrenics, and precariously-adjusted Normals with a poor cultural background.

I. ATTENTION AND CONCENTRATION: DIGIT SPAN AND ARITHMETIC

1. Comparison with the Verbal Subtests. In this section we shall advance some theoretical considerations which pertain to the two subtests—Digit Span and Arithmetic—to which the following sections will be devoted. In the Bellevue Scale these subtests are subsumed under the Verbal subtests. However, they differ radically from the four essentially Verbal subtests thus far discussed. First of all, Special Table 3 shows they are by far more vulnerable to maladjustment than the other Verbal subtests; this is indicated both by their low averages and by their great standard deviations for our total population. Secondly, in these subtests verbalization plays a quite different rôle than in the others. In Vocabulary, Comprehension, Information, and Similarities, the words carry the essential meaning of the response; in Digit Span and Arithmetic this is by no means true. The real distinction between the significance of the verbalization on the other Verbal subtests and of that on the two here segregated is hard to define at present. It is possible that the investigations here described will shed some light on these questions. It appears that in the first four subtests more *verbalization*, and in the latter two subtests more *vocalization*, is involved. In other words, it seems that in the essentially Verbal subtests the essence of the response is the communication of content which is inseparable from the verbalization which communicates it. This is not the case for Digit Span, where visual and/or auditory imagery may replace verbal imagery, and where no content specific to the subject or to the verbalization is communicated. It is also not the case for Arithmetic, where formal relationships, possibly in the form of abstract spatial images, are the content and are not necessarily bound up with verbal images and verbal communication.

2. General Considerations. In the opinion of the authors, the full significance of intelligence tests will be exploited neither by stating merely that the patient was poor on some and good on other subtests, nor by trying to connect directly the impairments of certain subtest scores with certain clinical-nosological categories; but rather only by attempting to understand and describe the psychological functions whose impairment or change brings about the impairment of scores. One reason is that there is no one-to-one relationship between any subtest achievement and the nosological category to which the maladjustment impairing that achievement belongs. Every nosological category is isolation—in a sense arbitrary—of a complicated, dynamic equilibrium of psychological functions. Every subtest score—and especially the relationship of every subtest score to the other subtest scores—is determined by a multitude of factors. If we are able to establish the main psychological function underlying the achievements on the subtests, and to infer from the impairment of the achievement an impairment or change of the function underlying the achievement, then we can hope to reconstruct a picture of multiple psychodynamic interrelationships out of the interrelationships of these achievements and impairments of functions; this in turn can be brought into relationship with a specific clinical picture, conceived of as a variant of the typical picture of a nosological category. It is on the basis of such considerations that we are in a position to draw diagnostic conclusions from the relationships of achievements and impairments on the subtests of an intelligence test.

This is the reason for devoting so much space to even a tentative construction of the rationale of the functions underlying subtest achievements. The present section will be especially extensive because it deals with functions which are in neglect and disrepute in current psychology, although they were considered to be of great significance in the early Wundtian and Titchenerian days. No effort will be made to clarify the relation of the concepts of "attention" and "concentration" here advanced to their historical predecessors. But no identity is presumed, and a definition of our concepts will be put forth.

3. The Definitions of Attention and Concentration. Attention and concentration are ill-defined concepts. We propose to give here a working definition of them without attempting to penetrate to a full theoretical clarification of their nature.

(a) Attention. If a person can devote himself freely to obtaining impressions, if he can read so that he goes with the stream of the book without being carried into other streams of thought or vagary, if he can listen to and absorb a lecture without effort and without suddenly discovering that he has been "absent", if he can participate in the flow of a conversation without again and again discovering that he has missed a part of it, then we may call his attention excellent and unimpaired.

This type of attention is to be distinguished from what frequently goes under the same name. There is a difference between "absorbing freely without effort" and "being absorbed", between "going with the stream" and "being carried away by the stream". In being absorbed or carried away, the interests or affects or strivings of the individual are intensely mobilized; in what is referred to here as "attention", this need not be the case. Many persons who are able to be absorbed or carried away may be unable to "attend".

In the terminology of psychoanalytic psychology, one might formulate this state of affairs as follows: attention corresponds to the free mobilizability of energies which are not specifically tied up with any particular affect, emotion, interest, or drive, but are at the free disposal of the Ego to be utilized in thinking and in dealing with reality. Being absorbed or being carried away is also a receptive form of psychological activity, but is characterized by the fact that the material is being "taken in" by virtue of its appeal to a strong specific affect, drive, or interest of the subject. In other words, it is much more a selective and less flexible type of receptivity than is "attention"; and this selectiveness hampers the intake of all that does not have an "affinity" to these selecting factors.

Attention is considered here an effortless, passive, unhampered contact with outside reality—a free receptivity. This free receptivity appears to be hampered if the subject's affects and anxieties are not well-controlled and get out of balance.

The hypotheses that underlie this view of attention are: (1) all psychological energies derive from instinctual sources; (2) part of these—affects, drives, strivings, impulses—bear the mark of their instinctual origin, and these will be herein referred to as "specifically-deployed" energies; (3) another part of the psychological energies, having lost in the course of development the marks of their instinctual origin, become freely available to the Ego for its "purposes", and these will be herein referred to as "not-specifically-deployed" energies; (4) attention depends upon the strength of the Ego, by which is meant that the "specifically-deployed" energies are kept in balance and control, harmonizing with and not encroaching upon the Ego's functions, nor demanding that it employ its "not-specifically-deployed" energies to curb them.

From these hypotheses, it becomes understandable that not only unbalanced affects and anxieties, but also overvalent (emotionally overloaded) ideas—such as vagaries, fantasies, obsessions, delusions—may be able to encroach upon attention, because in them the ideas are bound up with "specifically-deployed" energies.

(b) Concentration. In terms of the above hypotheses, concentration would mean employing the "not-specifically-deployed" energies in order to control the "specifically-deployed" energies, and to keep out of consciousness the ideational representations of the latter which interfere with "attending".

In contrast to attention, concentration may be characterized as an *active* relationship to outside reality. When one finds himself unable to take in freely what the flow of a book, a lecture, or a conversation brings to him, he may exert a conscious effort to keep out of consciousness all material that is not directly pertinent. This focusing of consciousness upon the current topic, by exclusion of other emotional or thought contents, we shall designate as concentration.

The effortful character of concentration, as contrasted with the effortless character of attention, is a conscious experience. It may be well to remind ourselves that not even receptive thinking is always effortless attending; and also that reproductive or productive thinking, as soon as its material becomes complex or the context in which it is called forth is not in itself conducive to its being remembered, usually becomes a voluntary effort—that is, concentration. Complexity of material generally arouses such a variety of ideas and affects that only an active conscious selective control of these—concentration—allows for coping with it.

Attention then may be regarded as automatic, concentration as a voluntary effort. It should be clear that in using the expression "voluntary", we do not imply here an independent psychological force, such as in the past has been termed "will". We refer rather to the energy freely available to the individual for disposal in intellectual processes, in contrast to specifically-deployed energies which are not so available. From this point of view, attention has been already characterized above as an expression of, or as a function of, the equilibrium of these specifically-deployed energies. That is, attention is a function of the Ego's efficacy in controlling these specifically-deployed emotional and intellectual energies so that their ideational representations enter consciousness at appropriate times only. In a strong Ego, this control is not experienced consciously. In a weak Ego, or where the material being dealt with is complex, not-specifically-deployed energies must be available to control and limit the field of consciousness. This control or concentration is experienced consciously. Where the Ego has more or less disintegrated, as in some Schizophrenics, these not-specifically-deployed energies are no longer available; and concentration becomes almost impossible. Furthermore, concentration, with its rôle of voluntary "selection", implies pre-existing patterns within the individual which enable appropriate selection to occur. Where however pre-existing patterns do not exist, as for instance in regard to the Digit Span material, voluntary effort is of little avail, and "straining" improves the score little, if at all.[63a]

4. The Relation of Digit Span and Arithmetic Scatter. In the following discussion of the Digit Span and Arithmetic subtests it will be maintained—and, in support, some statistical and qualitative considerations will be advanced—that the Digit Span may be considered a test of attention and Arithmetic a test of concentration. It is not maintained that no other functions underlie achievements on these two subtests: what is implied is rather that attention plays the major rôle in the Digit Span, and concentration in the Arithmetic, achievements; that the impairments on these subtests most frequently are understandable as impairments of these functions; and that no other subtest of the Bellevue Scale is related more clearly to these functions[63b].

Whether or not these hypotheses are correct, we have leaned heavily upon them in the analysis of these two subtests and their relationship; and they seemed to us to prove useful. It is possible that our attempts at developing psychological rationale for the subtests, more than the specific hypotheses employed, will in the long run prove clinically useful; while the hypotheses themselves may prove useful more in a theoretical psychology of thinking. There also, whether correct or not, these hypotheses may reopen the field for investigation and lead to new and more correct hypotheses. The reader, we trust, will find that these hypotheses were not arbitrarily dragged in, but were necessitated by the data advanced in the following two sections. These data were not encountered by the authors in previous literature, and appeared to demand explanation. We wish to discuss here the most striking of these data, before entering the detailed discussion of these two subtests. Inspection of Graph 2 of Special Figure 1 reveals that in the Neurotic groups, as well as in the Normal groups, Digit Span is poorer than Arithmetic. In other words, the Vocabulary Scatter of Arithmetic—that is, the drop of the Arithmetic scores below the Vocabulary level—is less than that of the Digit Span scores. This state of affairs is true even in the Depressive groups—though in the Neurotic Depression there appears to be a reversal present[64]—and even in the Preschizophrenic groups. The situation is different in the Schizophrenic groups; except for the Chronic Unclassified Schizophrenias, they tend to have a Digit Span scatter equal to or less than the Arithmetic scatter.

[63a] An exception to this is when the digits are transformed by voluntary effort into meaningful numbers or are made meaningful by a grouping procedure.

[63b] The Picture Completion—Concentration relationship will be discussed later.

Inspection of the individual cases makes the data even more striking. The fact is that the low average Vocabulary Scatter of Digit Span in Schizophrenics cannot be explained by assuming that Digit Span drops less than Arithmetic. In a number of Schizophrenic cases we have not only high positive Vocabulary Scatter of Digit Span, but also high weighted scores, which are quite out of keeping with the general score-level of these cases. The evidence of the case histories make it seem quite unlikely that some of these cases ever had a general intelligence level corresponding to their high score on Digit Span. We have two cases of Acute Unclassified Schizophrenia, and four cases of Paranoid Condition, with weighted scores of 16 and 17 on Digit Span. We have two Unclassified Schizophrenias, two Paranoid Schizophrenias, and one Paranoid Condition, with a weighted score of 14 on Digit Span. We have similar cases in the Preschizophrenics also, though here there are many cases with great drops in Digit Span which, as far as the average is concerned, cloud the issue.

At this point, the meaning of scatter should be rediscussed. The weighted score equalizes the subtest achievements of the standardization population—that is, creates statistically an "ideal" individual who would show equal weighted scores on each of the subtests. A subject's deviations from identical or nearly identical weighted scores on each subtest must thus be considered characteristic for him as an individual. This does not imply that every subject should conform to the average performance of the standardization group by whose scores the weighted scale was determined. It implies that the deviation from the average carries a meaning, and that this meaning is revealing not only in terms of depth of maladjustment and impairment of function, but also in terms of the specific nature of personality makeup and type of maladjustment. Thus, if an individual has a Digit Span score far above his present general level, or even far above what is inferred as his original level, this disparity must be meaningful.

---

[64] This reversal is due to one case which is, according to the clinical picture, clearly schizoid; its exclusion, as indicated by the dotted line, brings all the Depressive groups into the fold, showing that they all have a greater average Vocabulary Scatter of Digit Span than of Arithmetic.

Assuming that Digit Span is a test of attention and that Arithmetic is a test of concentration, then the fact that our Normal, Neurotic, Depressive, and even Preschizophrenic groups show a greater drop in Digit Span than in Arithmetic could be explained as follows: attention suffers first under the blows of anxiety, affect, and overvalent ideas; as long as concentration is relatively well preserved and the individual's Ego has non-specifically-deployed energies at its disposal, he is able to replace the impaired free receptivity by voluntary effort, or concentration. This is corroborated by experience: it is only too common for human beings of our civilization to replace natural effortless living by effortful concentration upon achievement.

But what happens in the schizophrenic? We would like to formulate the hypothesis—which we believe is in harmony with clinical observation—that the schizophrenic loses his ability to summon up voluntary effort to cope with a situation; and this would correspond to the impairment of concentration, seen in Arithmetic. However, he may or may not be able to show free receptivity to incoming stimuli. The free receptivity manifested in high Digit Span scores may be tentatively explained as due to two factors. (a) In teleological terms, the aim of the schizophrenic psychosis is to rid the patient of anxiety; if it be true that attention suffers, as in Neuroses, from the effects of anxiety, getting rid of anxieties should leave attention unimpaired. (b) The incoming stimulation may find an open door in some schizophrenics; that is, it will not be really "attended to", but rather taken in by virtue of its appeal to specific trends in the schizophrenic.

Other schizophrenics however show deep attention disturbances, as indicated by very poor Digit Span scores. This could be explained tentatively as follows: (a) acute "storm" of the schizophrenic psychosis may create a situation loaded with anxiety; (b) total withdrawal of interests may shatter the surface of consciousness turned toward the outside—that surface which, created by the stable balance of the specifically-deployed energies, affects, or strivings, gives the prerequisite sensitivity and reactivity to any stimulation.

The multiplicity of factors involved demands statistical evidence, but also forecasts that this evidence will be clouded by the overlapping factors.

To test the validity of these hypotheses, we first tested the reliability of the differences between Digit Span and Arithmetic Vocabulary Scatters plotted on Graph 2 of Special Figure 1. This statistical evidence is presented in Table 30. The table divides our cases into three groups: (a) the percentage of cases which have a Digit Span score 4 or more weighted-score units higher than their Arithmetic score; (b) the percentage of cases which have a Digit Span score 2 or 3 units more than their Arithmetic score; and (c) the percentage of cases which have a Digit Span score no more than 1 unit higher than their Arithmetic score. The table shows that the Schizophrenics tend to have a great superiority of Digit Span score over Arithmetic score. Only the Normais and the Involutional Depressives approach the Schizophrenics in this respect. We shall defer discussion of the Depressives, and turn to a consideration of the Normals.

In the nosological section of the introduction to this volume, we gave a clinical analysis of our control group. We pointed out there that a part of this group—though within the range of what is called "adjusted"—are persons of markedly schizoid characteristics. The supplementary table in Table 30 shows in these schizoid Normals a shift toward a higher Digit Span than Arithmetic score. In the range where Digit Span is higher than or equal to Arithmetic, we find 92% of all our Schizoid Patrolmen, but only 38% of our Non-Schizoid Patrolmen.[65a] In the range where Digit Span is lower than Arithmetic, we find only 8% of our Schizoid Patrolmen, but 62% of our Non-Schizoid Patrolmen. Although the extent of the shift in the Schizoid Patrolmen is not extreme as in the Schizophrenics, it nevertheless is present. From here on we shall call the reversal of the usual Digit Span-Arithmetic relationship an "out-of-pattern" relationship.

First let us turn our attention to the supplementary two Chi² tests in Table 30 pertaining to the Schizoid and Non-Schizoid subgroups of the Patrol. The tendency of the Schizoid Patrolmen toward an "out-of-pattern" relationship is statistically significant on a level below 1%. These differences, however, may give a distorted view of the state of affairs. The fact is that schizoid subjects who are still within the normal range will show this "out-of-pattern" tendency by keeping both Digit Span and Arithmetic high and nearly equal. To make this situation clear, in Table 31 we have given the distribution of the weighted scores of Digit Span for the Schizoid and Non-Schizoid Patrol subgroups. The frequency tables indicate that,

---

[65a] The designation "schizoid" was determined relative to the whole Patrol. Our Patrolmen in general, perhaps reflecting their rural background, revealed schizoid traits; but only the outstandingly schizoid ones were so designated. This is one of the possible explanations of the relatively large number of Non-Schizoid Patrolmen with a strongly "out-of-pattern" Digit Span and Arithmetic relationship.

TABLE 30-A.—OUT-OF-PATTERN RELATIONSHIP OF DIGIT SPAN AND ARITHMETIC

The Difference Between Scores on Digit Span and Arithmetic

Group	No. of Cases	% of Cases with D.Sp. > Arithmetic by:		
		≧ 4	2–3	≦ 1
U Sch A	17	35	12	53
U Sch Ch	13	8	15	77
U Sch D	7	29	14	57
P Sch A	11	18	—	82
P Sch Ch	10	20	10	70
P Sch D	5	—	—	100
P Co	13	23	23	54
S S	9	11	11	78
Pr C	16	6	19	75
Pr OI	16	—	25	75
DP	8	—	37	63
DI	7	29	—	71
DSN	9	—	11	89
DN	7	17	—	83
Hy	18	6	11	83
A & D	10	—	—	100
MN	9	7	16	67
O-C	16	6	13	81
Neuras	6	—	—	100
P (1)	32	22	3	75
P (2)	17	11	18	71
P (3)	5	20	—	80
Special Groups:				
U Sch	37	24	14	62
P Sch	26	15	4	81
Depr	31	10	13	77
Neurotics	59	5	10	85
Patrol	54	19	7	74

for Arithmetic, the Non-Schizoid Patrolmen have only 19% of their cases, while the Schizoid Patrolmen have 67% of their cases, in the high weighted-score range. For Digit Span, the Non-Schizoid Patrolmen have 26% of their cases, while the Schizoid Patrolmen have 82% of their cases, in the high weighted-score range. The differential significance of these distributions is established on a level below 1%. In other words, a schizoid individual appears to tend to develop a type of thinking of which one expression is the tendency to have higher Digit Span and Arithmetic scores—that is, a sharpened attention and a sharpened concentration. If the schizoid individual is not able to cope with reality and a breakdown occurs, concentration is likely to suffer first and only afterwards—if at all—attention. Nevertheless, it must be understood that there are many factors present in any strain and stress and any maladjustment; and thus the rule here arrived at is not without exception.

TABLE 30-B.—*Differential Significance of Percentages*

Groups Compared	Chi²(d.f. = 2)	Significance
U Sch : P Sch	2.89	20–30%
U Sch : Depr.	2.68	20–30%
U Sch : Neurotics	8.58	1–2%
U Sch : Patrol	1.59	30–50%
Patrol : Depr.	1.65	30–50%
Patrol : Neurotics	5.10	5–10%
Differential Significance of the Dichotomy: ≧2, <2. (d.f. = 1)		
U Sch : P Sch	1.70	10–20%
U Sch : Depr.	1.19	20–30%
U Sch : Neurotics	5.19	2–5%
U Sch : Patrol	.96	30–50%
U Sch : Patrol Non-Sch	1.27	20–30%
U Sch A : P Sch A	1.33	20–30%
U Sch A : Depr.	2.03	10–20%
U Sch A : Neurotics	5.97	1–2%
U Sch A : Patrol	1.80	10–20%
Differential Significance of the Dichotomy: ≧4, <4. (d.f. = 1)		
U Sch : Neurotics	6.04	1–2%
U Sch : Depr.	1.58	20–30%

The comparison of the different groups shows that the Unclassified Schizophrenics in general, and the Acute Unclassified Schizophrenics in particular, manifest the greatest tendency toward an "out-of-pattern" relationship. The differences among the clinical groups are not sharp because of the overlapping influence of the factors discussed above. The difference between the Unclassified Schizophrenics and the Neurotics is clear and sharp, because in the Neurotics the presence of anxiety pulls the Digit Span score far below the Arithmetic score.

Diagnostically, then, any superiority—especially a significant superiority—of the Digit Span score over the Arithmetic score should be taken as a schizoid or schizophrenic indication. Inasmuch as some degree of anxiety is to be expected even in normal populations, any equality—especially if on a high level, and if Digit Span and Arithmetic are above the general level of the other weighted scores of the subject—must raise a suspicion of schizoid trends. In the statistics the Patrol is not significantly differentiated from the Schizophrenics. However, normals who have the same "out-of-pattern" relationship are distinguished from Schizophrenics by generally having it on a high weighted-score level and showing little significant impairment of the Arithmetic score; this impairment is, however, widespread in the Schizophrenics.

TABLE 31.—*Analysis of Digit Span-Arithmetic Relationship in the Schizoid Patrol*

Part I: Out-of-Pattern Tendency

Group	No. of Cases	% of Cases with:		Chi^2(d.f. = 1)	Significance
		D.Sp.-A $\geqq 0$	D.Sp.-A < 0		
Patrol Sch	12	92%	8%	8.68	<1%
Patrol Non Sch	42	38%	62%		

Part II: Percentage Distribution of Weighted Scores on Digit Span

Group	No. of Cases	0–6	7–12	13–17	Chi^2(d.f. = 2)	Significance
Patrol Sch	12	8%	8%	83%	13.37	<<1%
Patrol Non Sch	42	10%	64%	26%		

Part III: Percentage Distribution of Weighted Scores on Arithmetic

Group	No. of Cases	0–7	8–12	13–17	Chi^2(d.f. = 2)	Significance
Patrol Sch	12	8%	25%	67%	10.08	<1%
Patrol Non Sch	42	12%	69%	19%		

We conclude that an Arithmetic score far below the Digit Span score occurs most frequently in Schizophrenics and in Schizoid Normals.[65b] In the Schizoid Normals neither score will be especially impaired, and the "out-of-pattern" relationship exists on a relatively high weighted-score level. These considerations are only a first step toward the psychology of attention and concentration. Although the following sections will contribute to the substantiation of the hypotheses here advanced, it is only a usefulness as practical guides and not a general validity which is claimed for these findings and considerations.

[65b] Our recent results appear to indicate that obsessive character formation also may lead to high Digit Span and Arithmetic scores, and even to out-of-patern relationship on that level.

J. DIGIT SPAN

1. Introduction. The Digit Span subtest consists of two parts: the first requires repetition of series ranging from 3 to 9 digits in length, as called out by the examiner; the second requires repetition in a *backwards* sequence of series from 3 to 8 digits in length. On any missed series an alternate is given, and if passed the item is credited. The raw score on this subtest is the sum of the number of digits in the longest series passed forward and backward. This raw score is translated into a weighted score by means of Wechsler's weighted score tables.[66]

The Digit Span subtest will be dealt with here as a test of attention, and will be taken out of the group of Verbal subtests under which Wechsler subsumed it. The justification for this procedure is seen in Special Table 3; here we see that while none of the four essentially Verbal subtests has an average score for our population less than 11.4, nor a standard deviation greater than 2.7; Digit Span has an average score of 9.8—about as low as that of any subtest—and a standard deviation of 3.3, greater than that of any other subtest. Thus, while the essentially Verbal subtests are the most stable, Digit Span is among the most vulnerable and the most variable subtests.

2. The Psychological Rationale of the Digit Span Subtest. As the general theoretical considerations concerning attention have already been advanced in the preceding section, we shall present here only some additional considerations on the rationale of the Digit Span subtest.

Digit Span has usually been assumed to be a test of memory in general, and of "memory-span" in particular. In the theoretical understanding and clinical experience of the present authors, this assumption is incorrect. Theoretically, the function of memory refers to logically meaningful[67] and emotionally relevant material which has been assimilated in reference to interests, attitudes, affects, and strivings of the individual; and been organized in the course of the retention period according to developmental changes and relations of these same dynamic factors; and is brought into consciousness again as "remembering" when these dynamic factors require it, or make it relevant in a new context.[68] How the *facts* of conditioning, habit formation, and association-by-contiguity are coordinated with this conception of memory is as yet an unsolved—and perhaps even untackled—problem.

---

[66] See Wechsler (28), page 182.

[67] This point constitutes the focal point of Gestalt-psychological theory, and its point of attack against the memory-theory of "association-psychology" and "conditioned-response-psychology". See e.g., Koehler (17), Koffka (18), and Katona (16).

[68] See in this respect Rapaport: Emotions and Memory (22), particularly Chapters I and X.

The difficulty of memory theory is reflected in the fact that the literature —as well as clinical practice—repeatedly makes a distinction between learning and incidental learning, and between immediate (recent) and delayed (remote) memory. It is highly questionable whether the immediate and delayed memory phenomena of the laboratory, and the recent and remote memory phenomena of clinical and life observation, are altogether comparable entities. Clinical experience shows that a high Digit Span score does not assure that the recent memory of a patient is intact, nor does a very low Digit Span score warrant the conclusion that recent memory is impaired. On the one hand, there is a distinct group of Schizophrenics in whom, although memory is disorganized, the Digit Span score is extremely high. Except for certain organic cases, memory impairment as seen clinically may accompany relatively or absolutely intact Digit Span score. On the other hand, there are normals and neurotics with impaired Digit Span whose recent memory as seen clinically is excellent.

It would be difficult to offer conclusive clinical evidence—rather than merely statements of clinical experience—in support of these contentions. The clinical concept of "recent memory" is a very indefinite one, referring sometimes to the patient's own complaints, sometimes to an absurd forgetting of what happened the day before, sometimes to memory lapses in the course of a single conversation, and sometimes to the patient's recall of a story told by the examiner. For these reasons, any comparisons of our results with clinical observation would remain here inconclusive. Rather, we will give some evidence in the form of examples from our data.

Let us take three cases in which Digit Span is badly impaired: Case 4 of the Anxiety and Depression group has a weighted score of 7 with a Vocabulary Scatter of -5; Case 4 of the Paranoid Conditions group has a weighted score of 4 and Vocabulary Scatter of -10; and Case 2 of the Obsessive-Compulsive group has a weighted score of 7 and a Vocabulary Scatter of -7. Let us turn now to data which may give us some estimate of these patients' memory functioning.

In the section on the Information subtest, the memory function implicit in that subtest was discussed; thus we shall take here the Information scores as one of the indicators of memory efficiency. The memory function in this subtest would be usually designated as "remote memory". The first case has an Information weighted score of 15, the second of 14, and the third of 16. Thus, although Digit Span is very low, the memory function implied in Information remains intact. Let us now turn to the Babcock Test, and in particular to the subtests requiring the immediate and delayed repetition of a story.[69] The first case does not have a Babcock Test. The score of the second case on the immediate recall is 12, on the delayed recall 17; that of the third case on the immediate recall is 15, on the delayed recall 16. We also introduced an error scoring for these two subtests of the Babcock Test.[70a] These error scores for the second case are 75 and 84, for the third case 20 and 60, respectively. Thus we see that in both the immediate and delayed recall of a story, these cases achieve adequate scores. In these cases, low Digit Span goes with high Information and good memory for meaningful material.

Let us take now two cases with very high Digit Span scores. Case No. 1 and Case No. 16 of the Acute Unclassified Schizophrenics have Digit Span scores of 13 and 17, respectively. The Information scores of these cases are 8 and 10, respectively. The scores for the two Babcock subtests here in question are, for Case No. 1, 7 and 5; for Case No. 16, 11 and 6. The error scores are, for Case No. 1, 186 and 118; for Case No. 16, 127 and 383.

If the Digit Span measured immediate memory or memory in any real sense, it would be difficult to explain why we find on all these three types of memory tests—Information and Immediate and Delayed Recall of a story—such divergent scores: high Digit Span score accompanied by low scores on these memory tests, and low Digit Span score accompanied by high scores on these memory tests.

Thus far the argument has been in terms of why Digit Span is not a test of memory.[70b] We shall now advance a few qualitative considerations, in terms of Digit Span as a test of attention.

---

[69] For this story, and for discussion of the memory function implied in its recall, see pages 323 ff.

[70a] See pages 356 ff.

[70b] In order to point up the fact that our treatment of the issues here involved simplifies matters too much and avoids coming to grips with a number of thorny problems, we shall quote from a communication of David Shakow. Quoting it does not imply agreement with his points, but is rather an effort to make the complexity of the situation clear. We agree with his statements concerning the difference between Digits Forward and Digits Backward, and concerning paretics whose attention disturbance is certainly not caused by anxiety. The correlations he quotes may or may not be indications of a common attention factor in the tests correlated. At any rate his comments are of importance in indicating that further theoretical clarification is urgently needed: "I must point out again the great weakness of dealing with DF and DB together. You save the situation somewhat by putting the two in the 'attention-concentration' group—the DB certainly involves the latter more. But there is something more to be said about the way in which you look at digit repetition. In the first place consider these correlations which come from a group of some 180 normals on whom our memory test is standardized: DF/Sent .47; DF/DB .57; DF/Immed.Story .38; DB/Sent .46; DB/Immed.Story .50; Sent/Immed.Story .52. So you see, at least according to our data, there is some relationship among these items involving the recall of new material. The correlations with old recall are, with few exceptions, much lower. What I am getting at is that I believe that you are oversimplifying the situation. By emphasizing your point in an all-or-none way you weaken your argument. It is possible that DB is a test of immediate learning primarily and attention secondarily and DF is a test of attention primarily and learning secondarily, but, except in very extreme instances, both are involved (you see that I am taking your anxiety component of attention seriously into account).

First, there is the qualitative similarity of the subjective experience in Digit Span performance to that described in the preceding section as typical for attention and its failures. Digit Span achievement is highest if intake is effortless and free. Patients who take it in a matter-of-fact form pass better than those who try very hard. Failure having once occurred, and the alternate series being passed with much effort, full failure is likely to occur on the series following: effort does not help on Digit Span, beyond a very narrow margin.

Secondly, the device of grouping the digits, which helps to extend the subject's digit span, changes its nature: it introduces "meaning" into it—in the sense of patterning the numbers, with intervals of hundreds, tens, and units, and with awareness of rises and falls in magnitude. These groupings may even give rise to past connotation. Such grouping is radically different from the visual, auditory, or vocal-motor imagery of the digit series which usually occurs. The introduction of meaning changes the function underlying Digit Span performance and in part makes it dependent on concentration.

3. Administration. A few points pertaining to the administration of the Digit Span subtest, not enlarged upon in the Bellevue Manual, will be here in place. Clinical experience seems to show a characteristic rhythm for each individual. This rhythm comes to expression in highly organized form in the splitting of Digit Span series into groups, and in the fluctuation in speed in serial performances of tasks such as Digit Symbol. In each individual there seems to be present a certain flexibility of this rhythm, which allows him to adapt to the rhythm of the examiner. A striking example of the decrease of this flexibility is found in those neurotics who comment that if the examiner were only a bit slower, or a bit faster, they could "get it". On trial, they prove to be right. A striking example of the rigidity of such rhythm in some neurotics is seen when, if the examiner inadvertently delays for a second in giving one digit or otherwise changes speed, certain subjects become confused and lose the series. An extreme impairment of rhythm—which may be due to extreme rigidity or to extreme disorganization of the rhythm, two alternate possibilities which one cannot decide between at present—is found in cases where more or fewer digits than given by the examiner are recalled. Quite possibly the disturbance of

---

Some evidence for what I say comes from our data on general paretics who show their greatest disturbances on DF and I am very doubtful if this difficulty could be accounted for on any anxiety basis. I believe that the anxiety element here is very minor and that the difficulty is almost entirely one of the 'impression' phase of learning. Of course one can define memory or learning in a number of ways but for me memory deals with non-sensical as well as with sensical material and covers all the range between them. I have a suspicion that in different groups different ratios of learning and anxiety are involved—which only makes the problem so much more complicated!"

attention seen in failures on the Digit Span subtest is intimately linked up with this matter of "rhythm", though at present nothing further can be said with any certainty. In line with these considerations the tester should keep in mind the following three administrative rules: (a) The necessity of keeping strictly to a stop-watch-timed one-second interval of presentation of digits increases in significance with the degree of maladjustment in the subject. (b) It is useful to note whether or not a subject groups the digits, and thus alters the nature of the task. (c) When a subject in repeating the digits gives more or fewer digits than actually called out by the examiner, this should be noted.

It is worthwhile to record whether the patient visualized the digits and read them off from his visual image, or whether he muttered them to himself and reproduced them with the help of verbal-motor or auditory technique.

It is generally advisable to watch for the type of errors occurring in repetition of digits. Failure of attention may manifest itself in several ways. (a) The patient may state, "I lost it", or indicate by voice or statement that he is not sure of certain digits. In this case we may deal either with a disorganization or temporary inefficiency making for failure, or with the subject's limit of attention; and the subsequent series will tell which is the case. Temporary and generalized inefficiency imperceptibly shade into each other here. (b) The patient may reverse the position of two digits, or displace a digit to another position. This procedure usually indicates temporary inefficiency; and though no general rule can be set down and no statistical proof advanced, such persons are frequently negativistic, harbor hidden antagonisms, and not infrequently prove better on Digits Backward than on Digits Forward. (c) Indicative of considerable personality disorganization are misses on the three, four, or five digit series, especially when these misses are accompanied by giving more or fewer digits than called out by the examiner, or by missing the first digit of a series. (d) A significantly lower score on Digits Backward than on Digits Forward is a sign of seriously impaired attention, notwithstanding a high total score. (e) Very few (3) digits passed forward or backward appears to be in itself a very malignant indicator, and always raises the suspicion of psychosis or disorder of organic etiology.

4. The Relation of Digits Forward to Digits Backward. Of all these qualitative observations, our records are sufficiently complete only for the statistical evaluation of the relationship of the score on Digits Forward to that on Digits Backward. Investigations into the other qualitative observations are urgently needed, and may prove diagnostically differentiating and theoretically significant.

TABLE 32-A.—RELATIONSHIP OF DIGIT SPAN FORWARD TO DIGIT SPAN BACKWARD. *Percentage of Cases in 3 Different Relationships*

Group	No. of Cases	DB > DF	DF − DB = 0 to + 2	DF − DB > + 2
U Sch A	17	6	59	35
U Sch Ch	13	8	69	23
U Sch D	7	0	71	29
P Sch A	11	18	64	18
P Sch Ch	10	20	70	10
P Sch D	5	0	80	20
P Co	13	0	85	15
S S	9	11	78	11
Pr C	16	0	69	31
Pr OI	16	0	62	38
DP	8	0	25	75
DI	7	0	57	43
DSN	9	0	89	11
DN	7	0	83	14
Hy	18	0	89	11
A & D	10	0	70	30
MN	9	0	89	11
O-C	16	0	94	6
Neuras	6	0	86	17
Patrol (1)	32	6	84	16
Patrol (2)	17	0	88	12
Patrol (3)	5	0	80	20
			Regular DF − DB = 0 to + 2	Irregular DF − DB other
Special Groups:				
(P + U) Sch	63		67	33
DP + DI	15		40	60
DSN + DN	16		88	12
Neurotics	59		86	14
Patrol	54		85	15

In evaluating the relationship of Digits Forward to Digits Backward, we divided our cases into three groups. In the first, the raw score of Digits Backward is greater than that of Digits Forward; in the second, the raw score of Digits Forward is not more than 2 greater than that of Digits Backward; in the third, the raw score of Digits Forward is more than 2 greater than that of Digits Backward.

Table 32-A gives the distribution of the percentage of cases for each clinical and control group in these three ranges. The data show that the normal—that is to say, the most frequent—relationship between the raw scores of Digits Forward and Digits Backward is that Digits Forward is higher than Digits Backward, with the difference not in excess of 2. Any disturbance of this relationship should be considered as a possible indicator of maladjustment. The table shows that the reverse relationship is most usually found in Schizophrenics, and particularly in the Acute and Chronic groups. An exaggeration of the normal relationship—that is, Digits Forward *much* better than Digits Backward, or what amounts to a great impairment of Digits Backward—is also present in the Schizophrenics; it is most frequent in the Depressive Psychotic groups. For our tests of differential significance, we established the dichotomy: "DF − DB = 0 to +2" (normal) and "DF − DB = other than 0 to +2".

Table 32-B shows that the Schizophrenics and Depressive Psychotics are significantly different from the Depressive Neurotics, the Neurotics, and the Normals.

Diagnostically, then, any reversal of the usual relationship will indicate the possibility of serious maladjustment. Occasionally a normal subject will also show such a reversal, as seen in 6% of the Patrol. An exaggeration of the usual relationship—that is to say, a raw score on Digits Forward *much* better than on Digits Backward—will most likely occur in the Depressive Psychotics and Schizophrenics. However, a few such cases will be found in the other groups also.

TABLE 32-B.—*Differential Significance of % Irregular*

Groups Compared	Chi^2(d.f. = 1)	Significance
(P + U) Sch : (DP + DI)	2.60	10–20%
(P + U) Sch : Neurotics	5.53	1–2%
(P + U) Sch : Patrol	4.40	2–5%
(DP + DI) : (DSN + DN)	5.70	1–2%
(DP + DI) : Neurotics	12.07	<<1%
(DP + DI) : Patrol	10.59	<<1%

5. Vocabulary Scatter of Digit Span: "t"-Test.

We turn now to a quantitative evaluation of the Vocabulary Scatter of Digit Span, the average of which in every clinical and control group is represented on Graph 2 of Special Figure 1. No group has an average scatter on Digit Span which is above the Vocabulary level. Special Table 3 gives the average score and its standard deviation for each subtest for our control population and is in harmony with this graph, inasmuch as it shows that Digit Span is one of the subtests having the lowest average score and greatest standard deviation—that is, one of the most vulnerable and variable subtests. The graph shows that, as in the other subtests considered thus far, the Depressive Psychotics and the Deteriorated Unclassified Schizophrenics show the greatest vulnerability of Digit Span. Not as in the other subtests, the next in vulnerability are the Neurotics, and especially those Neurotic groups in which overt anxiety appears to be a paramount feature—the Anxiety and Depression group and the Hysterics. Not as in the other subtests, the Schizophrenics in general are better than the Depressive Psychotics and on the same level as, or somewhat better than, the Neurotics. The Normals tend to retain their usual position, having a somewhat lower Vocabulary Scatter than the other groups. The least Vocabulary Scatter is found in the Acute Unclassified Schizophrenics and in the Normal range. That the Simple Schizophrenics nearly match these Normals is due partly to their poverty of vocabulary and partly to factors to be discussed below. Special Table 1 presents the statistical significance of the average Vocabulary Scatters. It is striking to note the great incidence of significant or nearly significant impairments. This is a reflection of the general sensitivity of Digit Span to maladjustment, and more specifically, as we shall show, to anxiety. This relation of the drop in Digit Span score and the presence of anxiety is indicated by the fact that the most significant drop in Digit Span occurs in the Hysterics and in the Anxiety and Depression group, which were described in the section on Nosology as characterized by intense anxiety. As a matter of fact, all 5 Neurotic groups have a significant drop in Digit Span scores.

The only other groups which drop with such significance are the Acute Paranoid Schizophrenics, the Over-Ideational Preschizophrenics, and the Well-Adjusted Patrol. The implication of this significant drop in the Well-Adjusted Patrol is that absence of anxiety, as already stated in the section on nosology, is not a prerequisite for being in the "normal" range. Our findings bring into marked relief how much anxiety and attention disturbance there may be even in "Well-Adjusted Normals".[71] The Borderline-Adjusted Patrol does not have a statistically significant drop of Digit Span, due to the relatively high incidence of Schizoid Patrolmen in this group; we have seen these Schizoid Patrolmen to have well-retained Digit Span scores.

The Acute Unclassified Schizophrenics which, of all the clinical groups, tended most to show an "out-of-pattern" relationship—with Digit Span well-retained, and Arithmetic impaired—also shows no trend to have a drop in Digit Span. Most of the other clinical groups show more or less significant tendencies to have Digit Span scores below the Vocabulary level. The meaning of such a finding could be that anxiety is present in nearly all clinical groups, and results in the more or less consistent and widespread impairment of Attention and consequently of Digit Span scores. In the Neurotic groups where anxiety is among the most prominent features impairment of Digit Span is especially significant. It is interesting to note in this respect that the Simple Schizophrenics, whom we have described to be relatively bland Psychotics, not showing appropriate anxiety, are among those who show the least tendency to have an impaired Digit Span. Extreme drops of Digit Span do occur in Schizophrenics, even more extreme ones than those regularly occurring in Neurotics and Depressive Psychotics. However, such extreme drops are more or less sporadic in the Schizophrenic groups.

We conclude that here, for the first time, impairment is not necessarily indicative of the depth of the maladjustment; but rather refers to a specific disturbing factor or factors which may be present in any kind of clinical or normal case. That is, the impairment of attention refers first of all to anxiety.

[71] It must be kept in mind that "normality" is not an absolute concept, and that it implies adjustment to one's own problems rather than meeting an absolute "norm".

TABLE 33-A.—VOCABULARY SCATTER OF DIGIT SPAN. *Percentage of Cases in Ranges of Scatter*

Group	No. of Cases	Percentages		
		≧ + 2	+1 to −3	≦ −4
U Sch A	17	30	46	24
U Sch Ch	13	23	31	47
U Sch D	7	0	57	43
P Sch A	11	9	36	55
P Sch Ch	10	10	50	40
P Sch D	5	0	60	40
P Co	13	32	23	45
S S	9	11	66	23
Pr C	16	19	44	37
Pr OI	16	6	50	44
DP	8	0	50	50
DI	7	14	28	58
DSN	9	0	56	44
DN	7	14	43	43
Hy	18	6	50	44
A & D	10	0	50	50
MN	9	11	56	33
O-C	16	6	38	56
Neuras	6	0	67	33
P (1)	32	12	56	32
P (2)	17	18	58	24
P (3)	5	20	60	20
Special Groups:				
U Sch	37	22	43	35
P Sch	26	8	46	46
Depr	31	6	45	48
Neurotics	59	5	49	46
Patrol	54	15	57	28
Patrol Sch	12	33	58	8
Patrol Non Sch	42	10	57	33
Patrol Anx	36	11	50	39
Patrol Non Anx	18	22	72	6
Patrol Anx, Non Sch	26	4	48	48
Patrol Non Anx, Non Sch	16	20	73	7
Patrol Anx, Sch	9	33	56	11

6. *Vocabulary Scatter of Digit Span: Chi² Test.*

Table 33-A presents the percentage distribution of cases, in all the clinical and control groups, into three ranges of Vocabulary Scatter: a Digit Span score 2 or more units above Vocabulary; a Digit Span score not more than 3 units below and not more than 1 unit above Vocabulary; and a Digit Span more than 3 units below Vocabulary.

Table 33-B presents the differential significance of these distributions, and shows that the relatively great amount of positive Vocabulary Scatter in the Acute and Chronic Unclassified Schizophrenics on the one hand, and the predominance of negative Vocabulary Scatter in the Neurotics on the other, distinguish these groups from each other. The differentiation of the Unclassified Schizophrenics from the other groups is somewhat obscured by the fact that they are also highly represented in the extreme negative range of scatter, and that the Deteriorated group does not follow the Acute and Chronic groups in their tendency to have positive Vocabulary Scatter.

TABLE 33-B.—*Differential Significance of Distribution of Cases*

Groups Compared	Chi²(d.f. = 2)	Significance
U Sch : P Sch	2.33	30%
U Sch (A + Ch) : (P + U) Sch D	4.05	10–20%
P Sch (A + Ch) : (P + U) Sch D	1.55	30–50%
U Sch : Depr	3.44	10–20%
U Sch (A + Ch) : Depr	4.79	5–10%
U Sch : Neur	6.32	2–5%
U Sch (A + Ch) : Neur	8.64	1–2%
U Sch : Patrol Non Sch	2.68	20–30%
Neurotics : Patrol	5.49	5–10%
Neurotics : Patrol Non Anx	12.09	<1%
Patrol Anx : Patrol Non Anx	6.81	2–5%
Patrol Sch : Patrol Non Sch	5.52	5–10%
Patrol Anx, Non Sch : Patrol Non Anx, Non Sch	8.83	1–2%
Patrol Anx, Non Sch : Patrol Anx, Sch	7.80	2%

The most striking features of Table 33, however, are the statistics concerning the Patrol. The Neurotics show only a trend to be differentiated from the total Patrol. But if we exclude the Anxious Patrolmen and compare the remainder with the Neurotics, the difference becomes significant below the 1% level. Furthermore, if we compare the Non-Anxious Patrol to the Anxious Patrol, this difference in distribution also is significant.

These findings are crucial; they give direct evidence that when anxiety is present, Digit Span drops. It should be kept in mind that anxiety is not the only—though it is apparently the major—factor impairing Digit Span. In any maladjusted group anxiety can, and as a rule does, play a rôle; thus its encroachment upon attention—that is, the Digit Span score—might have been predicted for clinical groups. But when a Normal group has been divided on the basis of a clinical psychiatric examination into cases showing significant evidences of anxiety and cases showing no such evidences of anxiety, and when the anxious group does significantly worse on Digit Span, the point is more safely established, and the effect of a specific dynamic factor is validly isolated. If, as we have attempted to show, the Digit Span subtest is one of attention, then it follows from the statistics concerning our Normal group that attention is susceptible to impairment by anxiety, and that this will be reflected in the Digit Span score.

Similar significance may be attached to the fact that, our Normals being divided into Schizoid and Non-Schizoid cases, we found the Schizoid cases tending to do exceedingly well on this test of attention, in contrast to the Non-Schizoid cases. We believe that here again we isolated the specific effect of a dynamic factor which, instead of encroaching upon efficiency of attention, serves to sharpen it.

If in relatively well-adjusted persons anxiety has its effect on Digit Span, one may expect that in clinical cases, where anxiety is assumed to be stronger, this effect will show up more sharply. Several questions emerge here: (a) Why is it that this effect does not show up uniformly in Schizophrenics? (b) Does this effect really show up more sharply in clinical cases than in the Patrol group? (c) Are there other factors operating in the Patrol which might decrease or increase the Digit Span score?

The first question can be answered in terms of clinical understanding. The currently prevailing theory of psychoses, and particularly of schizophrenic psychoses, assumes that the patient breaks with reality in order to throw off the intolerable pressure of anxiety. If this assumption is correct, it would be in harmony with the prevalence of cases with high positive Vocabulary Scatter of Digit Span in the Acute and Chronic Schizophrenics. What remains to be explained is why certain Acute and Chronic Schizophrenics, and particularly why the Deteriorated Schizophrenics, have a great drop in Digit Span. There are probably several reasons for this. Schizophrenia is not always successful in eliminating anxieties; and furthermore, in chronic and deteriorated states other factors, such as general withdrawal, may and do enter the situation and encroach upon attention.[72]

The second question can be answered in the affirmative. Even the difference between the Neurotics and the total Patrol approaches statistical significance; and if we compare the Neurotics with the Non-Anxious Patrol, the difference becomes significant. As the Depressives and the Neurotics do not differ greatly from each other, no special comparison of the Patrol and Depressives is necessary.

---

[72] It would be useless to give here a tabulation of anxious and non-anxious Schizophrenics, because a clinical assessment of anxiety is difficult even in well-adjusted individuals, as in the Patrol; this difficulty increases unsurmountably with psychotics. Similar is the situation with the clinical estimation of withdrawal. These factors encroach upon the validity of statistical evaluation; and only a study which sets out to investigate this particular problem can hope to untangle it.

The third question leads to new considerations. We designated in the Patrol a group which is Schizoid, according to clinical evaluation. This Schizoid group tends to have a high positive Vocabulary Scatter of Digit Span. Table 33-A indicates that in the high positive Vocabulary Scatter range the Schizoid Patrol has 33%, but that the Non-Schizoid has only 10%, of its cases; in the high negative Vocabulary Scatter range, the Schizoid has only 8% and the Non-Schizoid has 33%. The Chi^2 test indicates that this difference in distribution approaches significance. Thus, a factor is present—namely, that a part of the Patrolmen are Schizoid—which may obscure the difference between the Anxious and Non-Anxious Patrolmen. Our next task is to eliminate from the Anxious and Non-Anxious Patrol the Schizoid Patrolmen. The comparison of the remaining Anxious Patrolmen, with the remaining Non-Anxious Patrolmen indicates that the difference between these two groups is more significant than the difference between them when the Schizoid cases are included. Thus, exclusion of the interfering factor even sharpens the relationship between anxiety and drop of Digit Span. Further confirmation for the validity of this distinction can be found if one breaks down the Patrol into two groups, Anxious Patrolmen who are Non-Schizoid and Anxious Patrolmen who are Schizoid. The difference between the Vocabulary Scatter distribution of these two groups is statistically significant: in the Non-Schizoid Patrolmen anxiety tends to press down Digit Span, while in the Anxious and Schizoid Patrolmen it does not. Thus, schizoid trends in a normal oppose the impairing effect of anxiety on attention.

We conclude that the extent of impairment of Digit Span appears to indicate presence and degree of anxiety; that drops occur in Anxious Normals, and great drops occur in Neurotics and Depressives. Great positive Vocabulary Scatter usually indicates presence of schizoid features or of Schizophrenia proper. Extreme impairment of Digit Span may occur in Schizophrenic cases also; this indicates in some cases that the break with reality did not succeed in eliminating anxiety—and these cases usually have a better prognosis—and in others that deteriorative withdrawal has already set in, impairing attention.

Drops of the Digit Span score 4 or more points below the Vocabulary level are those considered here significant; and a Digit Span score 2 or more points above the Vocabulary score is considered high positive scatter. +2 and −4, then, are the diagnostic limits for the examiner evaluating Digit Span scatter.

7. Modified Mean Scatter: Chi² Test.[73] The Modified Mean Scatter for Digit Span is based on the deviation of the Digit Span score from the mean of the four essentially Verbal subtests: Comprehension, Information, Similarities, and Vocabulary.

Table 34-A presents the percentage distribution of cases in all the groups in three ranges of Modified Mean Scatter. It is striking that the Neurotics who score relatively high on most of the subtests have almost no cases with positive scatter of Digit Span, and have the greatest predominance of cases with great negative scatter. This distribution shows that the highest percentages of positive scatter are found in the Schizophrenic and Schizoid Patrol groups. On the other hand, the highest percentages of negative scatter are found in the Neurotic groups; they are followed by the Depressives, but the Schizophrenics also have a considerable percentage of cases with great negative scatter. In the middle range the Patrol, and more particularly the Non-Anxious Patrol, shows the greatest percentage of cases. In other words, the frequency distribution is in harmony with the previous findings. Table 34-B gives the differential significance of these distributions.

TABLE 34-B.—*Differential Significance of Distribution of Cases*

Groups Compared	Chi^2(d.f. = 2)	Significance
(P + U) Sch : Depr	1.69	30–50%
(P + U) Sch : Neurotics	8.72	1–2%
(P + U) Sch : Patrol	4.26	10–20%
(P + U) Sch : Patrol, Non Sch	10.14	$<1\%$
Depr : Neurotics	2.33	30%
Depr : Patrol	1.76	30–50%
Depr : Patrol Non Anx	5.15	5–10%
Neurotics : Patrol	9.75	$<1\%$
Neurotics : Patrol Non Anx	11.06	$<1\%$
Patrol Anx : Patrol Non Anx	4.05	10–20%
Patrol Sch : Patrol Non Sch	12.60	$<<1\%$
Patrol Anx, Non Sch : Patrol Non Anx, Non Sch	4.74	5–10%
Patrol Anx, Non Sch : Patrol Anx, Sch	13.34	$<<1\%$

We conclude that Digit Span scores well below the Verbal Mean are most characteristic of Neurotics, to a lesser extent of Depressives, and of Anxious Normals; that Non-Anxious Normals and Schizoid Normals show no such trends; and that Schizophrenics frequently show a striking efficiency on Digit Span.

---

[73] The Modified Mean Scatter measure for Digit Span (and Arithmetic) is somewhat different from the Modified Mean Scatter measure used for the analysis of the four essentially Verbal subtests. Inasmuch as Digit Span did not enter into the computation of the Verbal Mean, this mean itself was used as the baseline for scatter.

8. *Analysis of the Extreme Weighted Scores of the Digit Span Subtest.*

Special Figures 2 and 3 show that there is a greater number of cases with weighted scores of Digit Span below 6 and a smaller number with weighted scores above 15, than in the essentially Verbal subtests.

Special Figure 2 shows that 6 of the 13 cases—nearly half—which have such an extremely low weighted score are Depressives. There is only one Borderline-Adjusted Patrolman, 2 Hysterics, 2 Coarctated Preschizophrenics, one Deteriorated Paranoid Schizophrenic, and one Paranoid Condition among these cases.

Special Figure 3 representing high weighted scores shows that there are 21 such cases; 7 of these—one-third—are from the Patrol, 2 are Obsessive-Compulsives, 3 Preschizophrenics, and 4 Paranoid Conditions—altogether 9 in the "rationalizing" groups. Two who are Acute Unclassified Schizophrenics are the only Schizophrenics who have such high scores, and are from the group which most showed the presence of "out-of-pattern relationship". There are 2 Neurotic Depressives and no Psychotic Depressives.

In other words, the graphs show: (1) that the extreme drops in Digit Span are to be expected up to 50% in the Depressive groups; (2) that among the Neurotics only the Hysteria group, which is characterized by intense anxiety, has such cases; (3) that some Deteriorated Schizophrenics also show such extreme drops; (4) that high Digit Span scores are mostly present in the Normals, in the "rationalizing" clinical groups, and finally in the Acute Unclassified Schizophrenics characterized by "out-of-pattern" relationships. It should be kept in mind that many of our Normals had schizoid features, which may account at least in part for this great frequency of high Digit Span scores.

Table 35-A gives the weighted-score distribution of our groups on Digit Span. The Table shows that the greatest share of low weighted scores is held by the Deteriorated Unclassified Schizophrenics, the Depressive Psychotics, the Simple Schizophrenics, and the Hysterics. The groups having the greatest share of high weighted scores are the Acute Unclassified Schizophrenics, the Over-Ideational Preschizophrenics, the Paranoid Conditions, the Schizoid Patrol, and the Non-Anxious Patrol. The Neurotic Depressives and the Neurotics, excluding the Hysterics, tend to fall mainly in the intermediate range. In reference to the Patrol, it may be pointed out more specifically that the Schizoid Patrol is highly represented in the upper range and the Anxious Patrol is highly represented in the lower range; the Non-Anxious Patrol has no scores in the lower range. It is remarkable that if the high-scoring Schizoid Patrolmen are excluded from the Patrol, the remainder still has a very large share of cases in the high range. The explanation of this fact may have two aspects: partly it may be that the normal population tends in this direction; and partly it may be that in general the Patrol shows schizoid characteristics. No decision on this point can be made upon the basis of our material.

Taking into consideration the differential significance in Table 35-B, we conclude: (a) The great frequency of low weighted scores in the Depressive

TABLE 35-A.—*Percentage Distribution of Weighted Scores on Digit Span*

Group	No. of Cases	Percentages		
		0–6	7–12	13–17
U Sch A	17	6	53	41
U Sch Ch	13	15	78	8
U Sch D	7	57	29	14
P Sch A	11	18	73	9
P Sch Ch	10	0	70	30
P Sch D	5	20	80	0
P Co	13	15	46	38
S S	9	33	67	0
Pr C	16	19	56	25
Pr OI	16	0	44	56
DP	8	62	38	0
DI	7	43	57	0
DSN	9	11	78	11
DN	7	29	43	29
Hy	18	28	56	17
A & D	10	0	100	0
MN	9	11	78	11
O-C	16	0	75	25
Neuras	6	0	100	0
P (1)	32	6	56	38
P (2)	17	12	47	41
P (3)	5	20	40	40
Special Groups:				
(P + U) Sch (A + Ch)	51	10	67	24
(P + U) Sch D	12	42	50	8
DP + DI	15	53	47	—
DSN + DN	16	19	62	19
Neurotics	59	10	76	14
Neurotics − O-C	43	14	77	9
Patrol	54	9	52	39
Patrol Sch	12	8	8	83
Patrol Non Sch	42	10	64	26
Patrol Anx	36	14	61	25
Patrol Non Anx	18	—	33	67
Patrol Anx, Non Sch	26	15	78	7
Patrol Non Anx, Non Sch	16	—	40	60
Patrol Anx, Sch	9	11	11	78

Psychotics differentiates them from the Depressive Neurotics and from the Neurotics. It should be pointed out that, in contrast to the Depressives, the Verbal scores of the Neurotics are generally high; therefore the drop of Digit Span below their other Verbal scores, rather than their weighted score itself, is the best indicator of their impaired attention. This point again demonstrates that *intra*-personal scatter measures are more instructive than *inter*-personal scatter measures. (b) The great frequency of low weighted scores in the Deteriorated Schizophrenics differentiates them from the Acute and Chronic Schizophrenics. (c) The great frequency of high weighted scores in the Acute Unclassified Schizophrenics differentiates them in general from the other Schizophrenics and from the Neurotics. (d) Within the Neurotic range, the relatively great frequency of low weighted

TABLE 35-B.—*Differential Significance of Distribution of Weighted Scores*

Groups Compared	Chi^2(d.f. = 2)	Significance
(P + U) Sch (A + Ch) : (P + U) Sch D	7.78	2%
(P + U) Sch (A + Ch) : (DP + DI)	15.05	<<1%
(P + U) Sch (A + Ch) : Neurotics	1.80	30–50%
(P + U) Sch (A + Ch) : (Neurotics – O-C)	3.46	10–20%
U Sch A : (Neurotics – O-C)	8.53	1–2%
(P + U) Sch (A + Ch) : Patrol	2.93	20–30%
(P + U) Sch (A + Ch) : Patrol Non Sch	(same distribution: not tested)	
(P + U) Sch (A + Ch) : Patrol Sch	15.91	<<1%
(DP + DI) : (DSN + DN)	6.00	5%
(DP + DI) : Neurotics	14.78	<<1%
(DP + DI) : (Neurotics – O-C)	10.00	<1%
(DSN + DN) : Neurotics, (Neurotics – O-C)	(same distribution: not tested)	
(Neurotics – O-C) : O-C	4.21	10–20%
Hy : O-C	5.37	5–10%
Neurotics : Patrol	9.62	<1%
Neurotics : Patrol Non Anx, Non Sch	15.28	<<1%
(Neurotics – O-C) : Patrol	11.01	<1%
(Neurotics – O-C) : Patrol Non Anx, Non Sch	16.91	<<1%
Patrol Anx : Patrol Non Anx	9.69	<1%
Patrol Sch : Patrol Non Sch	13.31	<<1%
Patrol Anx, Non Sch : Patrol Non Anx, Non Sch	14.57	<<1%
Patrol Anx, Sch : Patrol Anx, Non Sch	18.81	1%

scores in the Hysterics tends to differentiate them from the Obsessive-Compulsives who, following the Schizophrenics, tend more to have high weighted scores. (e) The great frequency of high weighted scores in the Patrol—even if the low-scoring anxious cases and the high scoring schizoid cases are excluded—differentiates it from the Neurotics, who tend to have medium scores. (f) The great frequency of high weighted scores in the Schizoid Patrol differentiates it from the Non-Schizoid Patrol, and even from the Acute and Chronic Schizophrenics. This last finding may be attributed to the fact that, although the Digit Span score tends to remain high in these Schizophrenics in comparison to their other scores, the absolute level has been pushed down by the onset of the psychosis. The *intra-personal* scatter measure here also is effective in detecting this "schizophrenic pattern". (g) The greater frequency of low weighted scores in the Anxious Patrol differentiates it from the Non-Anxious Patrol. If the Schizoid Patrol is excluded, the differentiation between the Anxious and Non-Anxious Patrol becomes even more significant. It appears that the presence of anxiety in a Schizoid Normal does not lower the Digit Span score.

9. General Diagnostic Conclusions:

(a) An extreme discrepancy between Digits Forward and Digits Backward is in general indicative of psychosis.

(b) A Digit Span score much below the Vocabulary level and/or the Mean Verbal level is mainly indicative of the presence of anxiety.

(c) As anxiety is a common feature of most clinical and normal groups, this lowered Digit Span score is generally not a *diagnostic* indicator. But if the Digit Span score is extremely low both in itself and in relation to the other scores, the possibility of a Depressive Psychosis or Deteriorated Schizophrenia must be considered.

(d) A Digit Span score above the Vocabulary level and/or the Mean Verbal level is generally characteristic of non-deteriorated Schizophrenias among the psychoses, and of schizoid adjustment among the Normals. Among these Schizoid Normals, a high Digit Span score does not mean an absence of anxiety: anxiety in schizoid normals does not appear to affect their Digit Span score.

(e) That Digit Span is the best single subtest for indicating the presence of anxiety is evidenced by the finding that no other subtest shows such significant impairment in the Anxious Patrol. Object Assembly is the only other subtest to show a mild trend for the Anxious Patrol to do worse than the Non-Anxious Patrol, but, as we shall see in the analysis of that subtest, other factors such as Depressive and Schizoid trends result in even greater impairment on it.

(f) We have given evidence that anxiety is the greatest single factor which lowers the Digit Span score. If this subtest is considered a test of attention, then we have shown that anxiety does disturb attention. The general tendency for the Neurotics to do badly on this subtest in comparison to the others, and the sharp contrast between the Anxious and Non-Anxious Normals, may be taken as a proof for this point.

K. ARITHMETIC

1. Introduction. The Arithmetic subtest of the Bellevue Scale consists of 10 items.[74]

The items of the Arithmetic subtest are timed: three are to be answered in 15 seconds, three in 30 seconds, two in 1 minute, and two in 2 minutes. If answered within 15 seconds, the last two items merit an additional credit.

The items are for the most part daily life problems. The solution of Item No. 1 requires simple addition; that of No. 2 a simple subtraction; that of No. 3 a subtraction over a 10 limit; that of No. 4 and 5 each a simple division; that of No. 6 a simple multiplication and a subtraction over a 10 limit; that of No. 7 a division and a multiplication; that of No. 8 a division by a fraction; that of No. 9 two divisions, a multiplication, and the knowledge of how many feet there are in a yard; that of No. 10 the computation of an inverse proportion, with the multiplications and division implied in such a computation.

This subtest, like Digit Span, has been segregated from the four essentially Verbal subtests with which they were grouped by Wechsler. This segregation of Arithmetic is based on the facts presented in Special Table 3. The Table shows that the average weighted score on Arithmetic for our total population, though higher than that of Digit Span, is lower than that of any of the Verbal subtests, and, of all the subtests, has a standard deviation surpassed only by Digit Span and equalled only by Object Assembly.

[74]
1. How much is four dollars and five dollars?
2. If a man buys six cents worth of stamps and gives the clerk ten cents, how much change should he get back?
3. If a man buys eight cents worth of stamps and gives the clerk twenty-five cents, how much change should he get back?
4. How many oranges can you buy for thirty-six cents if one orange costs four cents?
5. How many hours will it take a man to walk twenty-four miles at the rate of 3 miles an hour?
6. If a man buys seven two-cent stamps and gives the clerk a half dollar, how much change should he get back?
7. If seven pounds of sugar cost twenty-five cents, how many pounds can you get for a dollar?
8. A man bought a second-hand car for two-thirds of what it cost new. He paid $400 for it. How much did it cost new?
9. If a train goes 150 yards in ten seconds, how many *feet* can it go in one-fifth of a second?
10. Eight men can finish a job in six days. How many men will be needed to finish it in a half day?

The Arithmetic subtest is classed here with Digit Span, partly because of their statistical similarity; partly because though they both require verbal-communication, the verbalization is in neither of them essential or indivisible from the response itself; and finally, because the Arithmetic subtest will be dealt with as a test of concentration, and as such its affinity with Digit Span—which has been dealt with as a test of attention—brackets them together.

2. The Psychological Rationale of the Arithmetic Subtest. The assumption that the Arithmetic subtest is a test of concentration underlies our treatment of it. The usual psychometric assumption is that Arithmetic is a good test of "g"; and, in fact, it correlates highly according to Wechsler's tables with most of the subtests, except for Picture Arrangement and Object Assembly. Arithmetic is considered here a test of concentration, because to pass the items of this subtest which, excepting perhaps the last two, consist of the four basic calculations, the subject—the average person of *our* civilization—must utilize *patterns* of arithmetical relations ingrained in him. He must reflect on and deliver the answers from the *patterns* that he possesses. Such focussing upon internally or externally, actually or potentially, existing patterns to discover and amend them, is concentration. Two questions emerge here: (a) Are not all the subtests of the Bellevue Scale such that concentration is necessary to their performance? And if so, why should Arithmetic specifically be considered a test of concentration? (b) Is it not possible to assume that the Arithmetic scores correlate so highly with most of the other subtests because it tests mainly concentration, and concentration is implied in the performance of the other subtests also?

To answer these two questions we must first examine the process of concentration. Concentration is a voluntary effort made in terms of either receptive or productive psychological activities. In *receptive* activity such voluntary effort can be made in order to insure intake of outside stimulation either when preoccupation with intra-psychic processes would encroach upon and make difficult the intake of such stimulation, or when the multiplicity of the outside stimulation is such that automatic effortless organization of the momentary intake becomes inefficient and must be replaced by voluntary selective effort. There are two conditions in external stimulation that interfere with attending and necessitate concentration: (a) interference of simultaneous stimuli in the same or in different sensory fields; (b) a more complicated and important type of interference, based on the fact that the individual, when stimulated, "takes in" not the stimulus but its meaning. Frequently, when the stimulus pattern becomes complicated, the meaning does not reveal itself automatically to the effortless attention. In such cases concentration, focussed upon discovery of the meaning of the stimulus pattern, becomes necessary. One might sum up by stating that in the *receptive* processes, concentration becomes necessary when external and/or internal stimuli interfere with each other, and when as a consequence of this or of the complexity of material, meaning is hidden.

At first glance the situation seems somewhat different for concentration in *productive* activity. Productive activity is considered here to be any activity that brings to consciousness memories, information, and knowledge of facts, events, and relationships that have been once experienced and now belong to the armamentarium of the individual's thinking. As a rule, such assets at the disposal of the individual come into his consciousness in an effortless manner. This ceases to be the case under certain conditions. If an idea, emotion, or general restlessness (anxiety) dominates consciousness, such effortless productive activity is hampered. Such might also be the case when the productive activity becomes quite complex and the production must take a systematized form. The individual then must scrutinize, select, and correct the results of his effortless productive activity. Such scrutiny is "reflection", or "turning back upon", one's thoughts. Scientific reasoning usually consists of both effortless productive activity and reflection or turning back upon it, scrutinizing, selecting, and organizing it. As a rule, if the effortless productive activity is to supply ideas to fit a complex ideational pattern already in consciousness, the effortless character of production ceases, and effortful concentration takes its place in order to assure lack of contradiction and homogeneity of conscious thought contents.[75a]

Thus, productive and receptive concentration fulfill essentially the same function. Both consist in seizing with conscious effort material at the individual's disposal, either in the external or in his internal psychological world. Both are called upon to function selectively, either when externally or internally interfering factors make free receptivity or productivity difficult, or when the complexity of the material to be received or produced requires critical scrutiny and selection not supplied by effortless attention.

After these considerations we may return to the two questions raised in the opening of this section. Undoubtedly, concentration becomes a factor in every one of the Verbal subtests as soon as any degree of difficulty—which will be individually variable—is encountered; in other words, as soon as verbal convention and automatic memory function fail to supply the pat answers. Yet Arithmetic will be considered here as a direct test of concentration.

To demonstrate the reasons for this, let us consider each subtest of the Bellevue Scale from the point of view of concentration: (a) Digit Span is a test of attention. Concentration, as was already stated in the section on Digit Span, does not avail the subject to obtain a good score on Digit Span once attention is impaired.[75b] (b) Information is an untimed test; the subject is not under a psychological time-pressure symbolized by the stop watch, and is not penalized for slowness. It might be held that concentration is important in helping to decide which of several available responses should be given. The material of these decisions is still supplied by automatic effortless memory function, which is hardly replaceable by concentration. As a matter of fact, people rarely call upon concentration in answering the Information questions. They give answers, both good and absurd, rather quickly and without too much deliberation, even when they have doubts about it: "Wasn't it Wilson?" would be a typical example of the form the response takes. Or one gets answers like this: "I am sure I know it. May I tell it to you later? It must come to me." It is here to a certain extent as with Digit Span and with the memories of our experiences in everyday life. Conscious effort is much less likely to bring back a name or a fact than free automatic memory functioning. (c) In the Comprehension items, the most that concentration might do is to collect a number of possibilities as pertinent responses. But in this test many possibilities make it not easier but rather more difficult to answer. If, in connection with the letter found in the street, one considers the possibilities of the postoffice, of the mail box, of deriving some advantage from opening the letter, of the legal consequences of opening it, of consulting someone who walked by, of finding the owner of the letter among passers-by, of the letter being some kind of a trap for him, and innumerable other variants—all of which are "logically" possible, and thus can be made available by sufficient concentration—one does not make judgment easier but more difficult. (d) The Similarities subtest is a test of comparisons—that is, of concept formation. As most of the Similarities items may be responded to with well-established generic verbal terms, concentration enters only when the subject's verbal concepts are too weak to make these generic verbal forms easily available. In these cases, concentration is more likely to deliver partial concrete or functional similarities—for example, a visual image of the objects to be compared, or some memories concerning them—thus making for an inadequate response. (e) In the Performance subtests, Block Design, Object Assembly, and Picture Arrangement are psychologically highly complicated; partly visual organization and visual-motor coordination, and partly planning and anticipation, enter into their performance. Although concentration is certainly required by them, their complexity clouds its rôle, and thus they cannot serve as concentration tests. In the Digit Symbol subtest, motor speed, absence or presence of motor inhibition or retardation, and a process of learning are all involved, and again the rôle of concentration is clouded and becomes partial. (f) The situation is different in the Picture Completion subtest. Here all the materials necessary for achieving a good response are put before the subject, and he works under the instructions to find what is missing; thus, his task is explicitly one of concentration. Knowledge or judgment for the most part do not enter these Picture Completion tasks. To illustrate this point, let us take the picture of the crab one of whose legs is missing on one side. One need not know what animal it is or how many legs it is supposed to have; consideration of these is rather a sign of impairment. All one need notice is that there is an asymmetry in an otherwise symmetrical animal. This example brings into relief that the task is one of systematic search for inconsistency in pattern—that is, concentration on the parts and whole of the picture. Perhaps this is even clearer when one compares the Picture Completion subtest with the Picture Arrangement subtest. This comparison is facilitated by the fact that, in both, small cards with similar types of drawings constitute the material of the test. In Picture Arrangement, a comparison of the pictures to each other and, on the basis of the general characteristics of one picture, an anticipation of the next step—that is, the step toward the picture that should follow—is the basis of performance. Where concentration is focussed on parts of an individual picture, it usually indicates to the examiner that the general survey of the pictures is faulty and that the subject is about to start off on a tangent suggested by some inconspicuous and irrelevant detail in a picture. In Picture Arrangement the trend in meaning of the individual pictures is conveyed to the subject by a free automatic attention and, if it fails, concentration usually leads to worse failure; while in Picture Completion the gap in pattern can only be perceived by concentration on parts of the pictures. In addition, the Picture Completion subtest is worked under time-pressure, the presence of which always emphasizes the rôle of concentration.

[75a] For the persistence of juxtaposed contradictions (primary process) in the Unconscious, and their elimination in conscious thinking (secondary process), see Freud: Interpretation of Dreams (9), pp. 525–549.

[75b] See however Footnote 63a.

It should be noted that in Picture Completion concentration takes place on visually presented material; thus visual organization plays a great rôle in the successful performance of the subtest, and concentration is not the sole factor involved—though the visual factor is not so potent as to totally overshadow the concentration factor, as happens in Digit Symbol, Block Design, and Object Assembly.

Thus far we have advanced only reasons why we consider only one subtest to be a test of concentration, even though concentration plays a rôle in others. We should like to add a positive statement of why the Arithmetic subtest is eminently a test of concentration. The subject matter of all the tests discussed—except, to a degree, Picture Completion—is "multi-dimensional" in character. In contrast, the subject matter of Arithmetic is a uni-dimensional continuum of numbers. In Arithmetic, all the material necessary for the response is before the subject, as in Picture Completion, as soon as the numbers in question are mentioned. It is true that in Arithmetic the numbers are embedded in verbal formulations; it is true that, in the last two Arithmetic items, lack of experience with the type of task may make concentration insufficient for coping with the problem, and a complicated process of reasoning and concept formation may become a part of solving the task. Therefore, cultural background may enter the response to the last two items and influence the achievement. The effects of this lack of familiarity on these two items in the average population may obtain on more of the items for subjects of below average intelligence. But on the level of the first eight items, nothing is required but concentration on and utilization of patterns the possession of which may be reasonably expected in the average American adult.[76] It is a test of the patient's ability to concentrate and, with this concentration, to summon up knowledge he has, within the limits of a given time. We do not wish to identify all kinds of arithmetic or mathematics as concentration proper; but on this level the necessary arithmetic knowledge is so ingrained that merely concentration comes into play in delivering it to consciousness.

The psychology of "arithmetic" is not a sufficiently explored territory. Nevertheless, it is clear that it is one of the purest forms of abstract thinking which follows most closely and is really the prototype of the rules of the secondary process,[77] and which, once obtained, does not have reference to any kind of past experience in its application. Thus its application is referable more to concentration proper than to any other aspect of psychological functioning. Every process of *ordered* thinking presupposes concentration, voluntary effort, employment of energies "non-specifically-deployed" and at the disposal of the Ego. But in much of ordered thinking the material upon which concentration is required is not available to the subject's consciousness, as are either the Picture Completion drawings through perception or the Arithmetical basic relations through introspection; the material of most ordered thinking must be first delivered "automatically" by memory, "anticipation", and so on. Thus concentration comes into play as a secondary function only, even though its rôle may be crucial in organizing complex material; while in the simple processes of ordered thinking implied in these arithmetic problems, concentration is the primary function at play.

Inasmuch as concentration replaces free attention if the latter is impaired, we would expect Arithmetic to be better preserved in Neurotic cases who, in spite of impairment of effortless attention, keep contact with reality and perform, usually with great effort, their everyday tasks. Analysis of the "out-of-pattern" relationship given in a previous section on

---

[76] We do not maintain that there are no individual differences in "mathematical" ability, or, in terms of our analysis, in the ability to establish and maintain sets of relationships which are necessary for arithmetic achievement. Our point is that the first 8 items of this subtest involve a group of basic and elementary relationships which are essential, and which are to be expected of the average American adult.

[77] "Secondary process" is the psychoanalytic term for conscious and ordered thought-processes.

"Attention and Concentration", shows that this is really the case; Arithmetic scores are better than Digit Span scores in Neurotics. On the other hand, we find that Schizophrenics who cease effort to keep contact with reality, and who do not have sufficient "not-specifically-deployed" energies available to control their impulses or ideation, show lower scores on Arithmetic than do the Neurotics, and even tend to show lower Arithmetic (concentration) scores than Digit Span (attention) scores.

It might be presumed that the control group would have better Arithmetic scores than the Neurotics; but this is not necessarily the case. First, some of the Neurotics will, by strenuous concentration, achieve good scores. Secondly, the cultural factor influences achievement on the Arithmetic subtest, especially in the last two items. Finally, the Patrol, excepting the Schizoid cases, tends to have some impairment of concentration.

3. Administration. A few points of administration not enlarged upon in the Bellevue Manual should be taken up here.

(a) Wechsler suggests that in general a subject should be allowed to finish an item even though the time-limit expires. We suggest that failures due merely to overstepping the time-limit, and particularly when overstepping it by only a few seconds, be taken into consideration in the *qualitative* evaluation of the weighted score.

(b) We recommend that those subjects who give quick erroneous responses should be told they are wrong; and if correct response is forthcoming within the time limit, it should be credited with half score. If the error is an error in principle, or due to a basic impairment, no correction will be forthcoming; but if "temporary inefficiency" is present, the correction merits some credit.

(c) We recommend that help be given to failing subjects, and that either the degree of help necessary for success or the inability to succeed in spite of help be established; thus it may be decided whether poor achievement is due to "temporary inefficiency" or to basic impairment.

(d) Erroneous results should be inquired into, to see whether they come from "temporary inefficiency" or error in principle.

(e) In contrast to Wechsler's recommendation, we suggest that no Arithmetic item, not even the easiest, be omitted in administering the test to any subject; "temporary inefficiency" of concentration shows up most clearly on the easiest items.

(f) "Thinking out loud" on all the more difficult items should be encouraged, so that errors of principle, methods of thinking, and solidity or disintegration of "patterns" may be better perceived by the examiner.

4. Item Analysis of the Arithmetic Subtest. In the analysis of the 10 items of Arithmetic, we will keep in mind the theses that misses on the easiest items are of diagnostic significance, and that misses on difficult items are meaningful in terms of educational background.

Figure 15 and Table 36 represent the breakdown of the items of the Arithmetic subtest into three degrees of difficulty, and a fourth group of instances where extra credit was allotted to the last two items when passed within 15 seconds. The breakdown was based, as in other subtests, on the frequency of failures in the Patrol: 3% of the easy items failed, 14% of the intermediate items failed, and 52% of the difficult items failed.

In Figure 15 the graphline representing the five "easy" items—1, 2, 5, 6, 7[78]—in terms of the percentage of misses of all chances on them, shows that the Patrol, the Preschizophrenics, the Paranoid Conditions, and the Hysterics have very few failures; while the Schizophrenics, particularly the Deteriorated Schizophrenics, and the Depressives, particularly the Involutional Depressions, tend to have the most failures. The graphline representing the percentage of failures on the three items of intermediate difficulty—3, 4, 8[79]—shows that, except for the Severe Neurotic Depres-

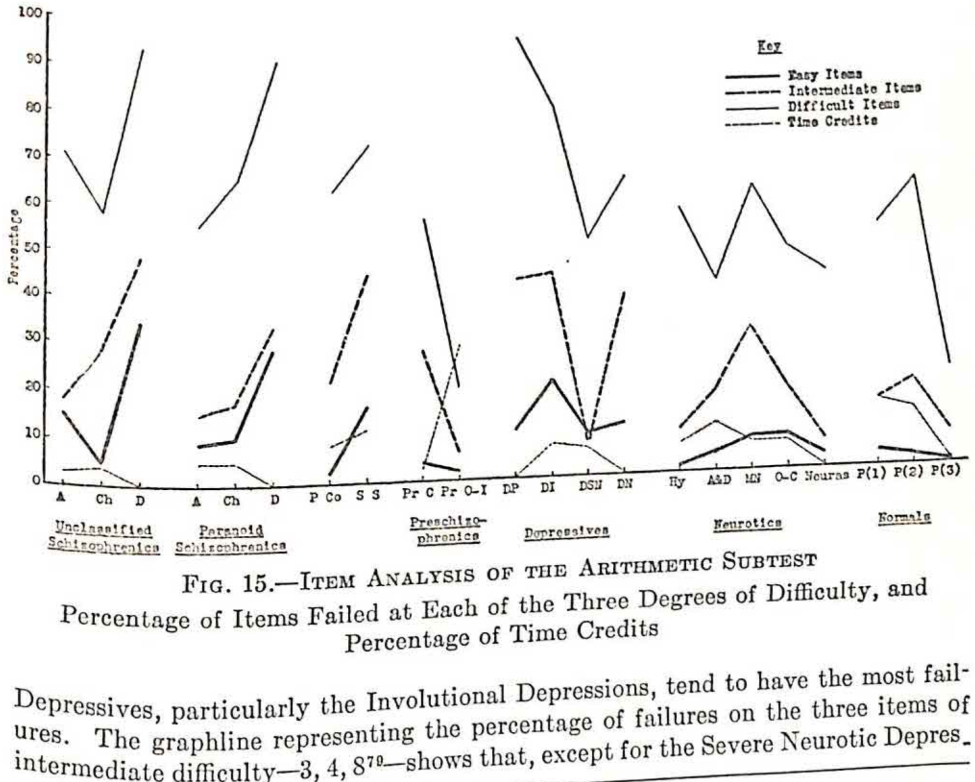


FIG. 15.—ITEM ANALYSIS OF THE ARITHMETIC SUBTEST
Percentage of Items Failed at Each of the Three Degrees of Difficulty, and Percentage of Time Credits

---

[78] 1. How much is four dollars and five dollars? (time limit: 15″).
2. If a man buys six cents worth of stamps and gives the clerk ten cents, how much change should he get back? (15″).
5. How many hours will it take a man to walk twenty-four miles at the rate of three miles an hour? (30″).
6. If a man buys seven two-cent stamps and gives the clerk a half dollar, how much change should he get back? (30″).
7. If seven pounds of sugar cost twenty-five cents, how many pounds can you get for a dollar? (60″).

[79] 3. If a man buys eight cents worth of stamps and gives the clerk twenty-five cents, how much change should he get back? (15″).
4. How many oranges can you buy for thirty-six cents if one orange costs four cents? (30″).
8. A man bought a second-hand car for two-thirds of what it cost new. He paid $400 for it. How much did it cost new? (60″).

TABLE 36-A.—*Percentage of Misses on Arithmetic Items of 3 Levels of Difficulty and Percentage of Time Credits*

Group	No. of Cases	Easy	Intermediate	Difficult	% Time Credit
U Sch A	17	15	18	71	3
U Sch Ch	13	5	28	58	4
U Sch D	7	34	48	93	—
P Sch A	11	9	15	55	5
P Sch Ch	10	10	17	65	5
P Sch D	5	28	33	90	—
P Co	13	2	21	62	8
S S	9	16	44	72	11
Pr C	16	4	27	56	3
Pr O-I	16	2	6	19	28
DP	8	10	42	94	—
DI	7	20	43	79	7
DSN	9	9	7	50	6
DN	7	11	38	64	—
Hy	18	1	9	56	6
A & D	10	4	17	40	10
MN	9	7	30	61	6
O-C	16	7	17	47	6
Neuras	6	3	6	42	—
P (1)	32	3	14	52	14
P (2)	17	2	18	62	12
P (3)	5	—	7	20	—
Special Groups:					
(P + U) Sch (A + Ch)		10	20	63	4
(P + U) Sch D		32	42	92	—
Depr		12	31	74	3
Neurotics		4	15	50	6
Patrol		3	14	52	12
Patrol Anx		2	9	49	15
Patrol Non-Anx		3	20	58	6

sives all groups have more failures than on the easy items. The groups with the least failures are the Over-Ideational Preschizophrenics, the Severe Neurotic Depressives, the Hysterics, the Neurasthenics, and the Maladjusted Patrol. The other Depressives and the Deteriorated and Simple Schizophrenics show the greatest per-

TABLE 36-B.—*Differential Significance of Percentages*

Groups Compared	Chi^2(d.f. = 1)	Significance
Misses on Easy Items		
(P + U) Sch (A + Ch) : (P + U) Sch D	16.45	<<1%
(P + U) Sch (A + Ch) : Neurotics	6.12	1–2%
(P + U) Sch (A + Ch) : Patrol	11.69	<<1%
(P + U) Sch D : Depr	8.39	<1%
Depr : Neurotics	14.32	<<1%
Depr : Patrol	11.10	<<1%
Misses on Intermediate Items		
(P + U) Sch (A + Ch) : (P + U) Sch D	6.58	1%
(P + U) Sch (A + Ch) : Depr	3.64	5–10%
(P + U) Sch (A + Ch) : Neurotics	too close, not done	
(P + U) Sch (A + Ch) : Patrol	1.31	20–30%
(P + U) Sch D : Depr	.85	30–50%
(P + U) Sch D : Neurotics	11.57	<<1%
(P + U) Sch D : Patrol	12.61	<<1%
Depr : Neurotics	8.45	<1%
Depr : Patrol	9.40	<1%
Time Credits		
Patrol : (P + U) Sch (A + Ch)	3.70	5–10%
Patrol : Depr	2.84	5–10%
Patrol : Neurotics	1.86	10–20%

TABLE 36-C.—*Percentage of Cases with Misses and with Time-Credits*

Group	No. of Cases	Item Groups			
		Easy	Intermediate	Difficult	Time Credit
		Misses > 1	> 1	= 2	1-2
(P + U) Sch (A + Ch)	51	14	14	49	8
(P + U) Sch D	12	50	33	83	0
Depr	31	16	23	65	6
Neurotics	59	7	5	36	10
Patrol	54	2	11	37	15

centage of failures. The Patrol begins to show its limited background by coming into the range of the Neurotics, while on the easy items it had fewer failures than they.

The graphline representing the percentage of failures on the two most difficult items—9 and 10[80]—shows that here again the Deteriorated Schizophrenic and the Depressive Psychotic groups have the greatest tendency to fail, although the other groups show this tendency too. The differences between the other Schizophrenic groups and the Neurotics here tend to equalize. Only the Over-Ideational Preschizophrenics keep their percentage of misses below 20%; and another "rationalizing" group, Anxiety and Depression, comes to the foreground with a low percentage.

TABLE 36-D.—*Differential Significance of % of Cases*

Groups Compared:	Chi^2(d.f. = 1)	Significance
Easy Items		
(P + U) Sch (A + Ch) : (P + U) Sch D	5.75	1-2%
(P + U) Sch (A + Ch) : Neurotics	.80	30-50%
(P + U) Sch (A + Ch) : Patrol	3.70	5-10%
(P + U) Sch D : Depr	3.59	5-10%
(P + U) Sch D : Neurotics	12.03	<<1%
(P + U) Sch D : Patrol	19.20	<<<1%
Depr : Neurotics	1.07	30%
Depr : Patrol	4.14	2-5%
Intermediate Items		
(P + U) Sch (A + Ch) : (P + U) Sch D	1.41	20-30%
(P + U) Sch (A + Ch) : Depr	.53	30-50%
(P + U) Sch (A + Ch) : Neurotics	1.04	20-30%
(P + U) Sch D : Depr	.11	70-80%
(P + U) Sch D : Neurotics	6.06	1-2%
(P + U) Sch D : Patrol	2.24	10-20%
Time Credits		
Patrol : (P + U) Sch (A + Ch)	.66	30-50%
Patrol : (P + U) Sch D	.87	30-50%
Patrol : Depr	.64	30-50%
Patrol : Neurotics	.21	50-70%

Their limited cultural background puts the Patrol into the range of the Neurotics, who are only slightly below the better Schizophrenics and Depressive Neurotics. However, the cultural effect here is much less significant than on Information or Similarities, as is to be expected on a *concentration* test.

The graphline representing the percentage of instances in which added time-scores were obtained on the 9th and 10th items shows that only the Over-Ideational Preschizophrenics and, to a lesser degree, the Well-Adjusted and the Borderline-Adjusted Patrol obtain an appreciable amount of such credits.

---

[80] 9. If a train goes 150 yards in ten seconds, how many *feet* can it go in one-fifth of a second?
10. Eight men can finish a job in six days. How many men will be needed to finish it in a half day?

Before turning to the Chi² tests of the differential significance of the frequencies represented in Figure 15, we must consider this item breakdown from a more qualitative point of view.

Table 37 gives the percentage of failures on all the items in the major groups. Let us first take the easy items. Inspection of the Table shows that on the items No. 1 and 2, which consist of a simple addition and a simple subtraction respectively, there are no misses in any group except the Deteriorated Schizophrenic. Thus, both the statistical results and the qualitative simplicity of the tasks makes it plain that these two items should be in the easy group. The situation is somewhat different for Item No. 5. An inspection of Table 37 shows that no Patrolmen miss this item; and thus, statistically, we have reason to put it into the easy group. Qualitatively, it is not immediately obvious why this item (involving division) should be in the easy group, when Item No. 3 (involving merely a subtraction over a ten limit) falls, statistically, into the intermediate group. Furthermore Item No. 4, which is also a division, belongs in the intermediate group. Here we have an item of identical qualitative difficulty with Item No. 5, but which nevertheless is failed more frequently. The conclusion offers itself that Item No. 5 appears statistically easier because the work on Item No. 4 (and, in some cases, assistance from the examiner) has prepared the subject for Item No. 5. The inference is permissible that the Patrol's failures on Item No. 4 were probably results of "temporary inefficiency", which may occur either as overstepping the time limit or as a miscalculation. The appreciation of the relationship implied in the problem—that is, division—is however always present in Normals. We are not in a position to give a detailed breakdown of performance time on all the items of this subtest, partly because of the deficiencies of our material and partly because of space limitations. Nevertheless, inspection of our material appears to support this conclusion. A relationship similar to the one just discussed obtains between Item No. 3, in the intermediate group, and

TABLE 37.—*Percentage of Misses on the Ten Items of the Arithmetic Subtest*

Groups	No. of Cases	1	2	3	4	5	6	7	8	9	10
(P + U) Sch (A + Ch).......	51	0	0	18	6	10	25	16	35	61	65
(P + U) Sch D..............	12	17	0	33	42	33	67	42	50	92	92
Depr......................	31	0	0	26	23	3	32	26	45	77	71
Neurotics..................	59	0	0	7	5	5	10	7	34	46	54
Patrol.....................	54	0	0	11	15	0	6	7	17	48	56

Item No. 6, in the easy group. Item No. 3 implies merely a subtraction over a ten limit, while Item No. 6 implies a multiplication as well as a subtraction over a ten limit. Yet the more complex item falls in the "easy" group, statistically, while the simpler item falls in the intermediate group. The answer again is that the previous exercise has facilitated the performance of Item No. 6. It is most interesting to see that this facilitation occurs in none of the clinical groups, and is present *only* in the Patrol group. Item No. 7 is also in the easy group, although it implies multiplication and division. The item is obviously more complex than Item No. 3, and again only the facilitating effect of the preceding exercise can be offered as explanation. If Item No. 7 is compared with the qualitatively similar Item No. 4, it again becomes clear that only the Patrol shows an effect of facilitation; the clinical groups either remain on the same level of failures, or fail even more on Item No. 7 than on Item No. 4. Item No. 8 belongs both statistically and qualitatively in the intermediate group; and Items No. 9 and No. 10 belong in the difficult group.

Table 36-A gives the percentages of failure on the items of each degree of difficulty for all our groups. Inspection of the Table supports the conclusions described in connection with Figure 15. Table 36-B gives the Chi² tests of the differential significance of frequency of failure.

Table 36-B analyzes the failures on the easy items. The Deteriorated Schizophrenics have significantly more misses than the Acute and Chronic Schizophrenics and the Depressives. The latter groups are in turn significantly differentiated from the Neurotics, and even more significantly from the Patrol.

Table 36-B also analyzes the amount of extra time credit obtained on the last two items. Although it is clear from this table that no case among the Deteriorated Schizophrenics, and in the other Schizophrenics and in the Depressives no more than one case per group, obtains such credit, these groups show only a trend to be worse than the Patrol and Neurotics.

Turning back to Table 36-A, it is interesting to note that the Anxious Patrol appears to do better on all levels of difficulty than the Non-Anxious Patrol. This is in contrast to the Digit Span inferiority of the Anxious Patrol; and is an indication of how, when concentration is required, energy is available in Normals for a successful and efficient performance in spite of anxiety. Why the Anxious Patrol should do *better* than the Non-Anxious Patrol cannot be determined as yet.

Table 36-C analyzes the failures on Arithmetic items of the three degrees of difficulty in terms of the number of cases failing. In Table 36-D it is shown that on the "easy" items the Deteriorated Schizophrenics are in general significantly worse than all other groups. The Neurotics and the Patrol especially have almost no cases with more than one failure on the easy items. The Acute and Chronic Schizophrenics and the Depressives tend to do worse than the Neurotics and Patrol. In Table 36-D it is shown that on the intermediate items—although the significances are less striking—the same trend is followed as on the easy items, except that here the Patrol does worse than the Neurotics. This decrease in the significance of the differentiation is again due to the fact that those failures which occur in the poor clinical groups, such as the Deteriorated Schizophrenics and Depressives, tend to be massed in only part of the cases, while others perform more or less well; hence, the differences in terms of the percentage of cases are not sharp.

In general, the massing of such misses, although it occurs in relatively few cases, may be taken to indicate the presence of a Deteriorated Schizophrenic Psychosis or a Depression.

5. *Vocabulary Scatter: "t"-Test.*

The Vocabulary Scatter of the Arithmetic subtest is represented in graph 2 of Special Figure 1. The main import of this graph and the "t"-tests in Special Table 1 pertaining to it is that they again reaffirm the vulnerability of the Arithmetic subtest as compared to the other subtests, excepting Digit Span.

According to the graph, the most outstanding feature of the Vocabulary Scatter of Arithmetic is the extreme impairment of the Deteriorated Schizophrenics and the Depressives. Another striking feature is that the scatter is small in the Patrol. The Neurotic groups are varied in their scatter; the Hysterias show no more scatter on Arithmetic than the Patrol, while the Obsessive-Compulsives and Mixed Neurotics show scatter comparable to that of the Acute and Chronic Schizophrenics. It is however noteworthy that the scatter of Arithmetic of these Neurotic groups still remains less than their scatter of Digit Span.

For the statistical evaluation of the means represented on this graph, we turn to Special Table 1. This table shows that Arithmetic tends to drop more, in average, and with greater significance than Comprehension, Information, and Similarities. Arithmetic scatter is greater and/or more significant than Digit Span scatter in the Unclassified Schizophrenic group, but smaller and less significant in the Neurotic and Normal groups. The Paranoid Schizophrenics and the Preschizophrenics tend to associate here with the Neurotics, as do most of the Depressives. The only exception in the Neurotic groups is the Obsessive-Compulsive group; although it has a smaller average drop in Arithmetic than in Digit Span (−2.4 versus −3.2), its Arithmetic drop is more significant than the Digit Span drop. Here again the Obsessive-Compulsives tend to follow the schizophrenic pattern.

6. *Vocabulary Scatter: Chi² Test.*

The analysis of Vocabulary Scatter of Arithmetic in terms of percentage of cases in various ranges of scatter is presented in Table 38.

Table 38-B presents the differential significance of these distributions, and in general supports the trends presented in Special Figure 1 and Special Table 1. The Unclassified Schizophrenics are significantly worse on Arithmetic than the Neurotics or Patrol; the Depressives show a trend to be worse than the Neurotics and the Patrol. Among the various subdivisions of the Patrol, the only finding of significance is that the Schizoid Patrol reveals a mild trend to do better on Arithmetic than the Non-Schizoid Patrol. The Preschizophrenics also tend to do well. The Paranoid Schizophrenics, though not doing as badly as the Unclassified Schizophrenics, still do worse than the Patrol and the Neurotics; the statistical differentiation is however weak.

We conclude that (a) a great drop of the Arithmetic score below the Vocabulary level is most frequent in Schizophrenics, especially Deteriorated Schizophrenics, and in Depressives; (b) the Arithmetic score appears not

TABLE 38-A.—VOCABULARY SCATTER OF ARITHMETIC. *Percentage of Cases in Ranges of Scatter*

Group	No. of Cases	Percentages		
		$\geqq -1$	-2 to -3	$\leqq -4$
U Sch A	17	29	24	47
U Sch Ch	13	38	15	46
U Sch D	7	29	—	71
P Sch A	11	46	18	36
P Sch Ch	10	40	30	30
P Sch D	5	40	—	60
P Co	13	31	31	38
S S	9	34	55	11
Pr C	16	69	6	25
Pr O-I	16	50	31	19
DP	8	26	37	37
DI	7	28	14	58
DSN	9	56	22	22
DN	7	29	13	58
Hy	18	61	22	17
A & D	10	60	10	30
MN	9	56	33	11
O-C	16	38	31	31
Neuras	6	83	—	17
P (1)	32	60	18	22
P (2)	17	41	35	24
P (3)	5	100	—	—
Special Groups:				
U Sch	37	32	16	51
P Sch	26	42	19	38
(P + U) Sch (A + Ch)	51	37	22	41
(P + U) Sch D	12	33	—	67
Depr	31	35	23	42
Neurotics	59	56	22	22
Patrol	54	57	22	20
Patrol Anx	36	64	19	17
Patrol Non-Anx	18	44	28	28
Patrol Sch	12	75	25	—
Patrol Non-Sch	42	52	21	26
Patrol Anx, Sch	26	59	19	22
Patrol Non Anx, Sch	16	40	27	33

to be as vulnerable to impairment by normal and neurotic anxiety as the Digit Span score; (c) the Schizoid Normals tend to do better on the Arithmetic subtest than do the Non-Schizoid Normals.

The second of these points deserves further comment. In our qualitative analyses of Digit Span and Arithmetic, we hypothesized that Digit Span was a measure of attention and that Arithmetic was a measure of concentration. We also stressed that in normal and neurotic persons attention may be impaired by anxiety; but that the voluntary effort of concentration was in such persons generally sustained and even put to use in replacing attention. The statistical results given above are consistent with these hypotheses.

TABLE 38-B.—*Differential Significance of Percentage of Cases*

Groups Compared	Chi^2(d.f. = 2)	Significance
(P + U) Sch (A + Ch) : (P + U) Sch D	4.16	10–20%
U Sch : P Sch	1.08	50–70%
U Sch : Depr	.75	70%
U Sch : Neurotics	8.93	1–2%
U Sch : Patrol	9.70	<1%
P Sch : Neurotics	2.58	20–30%
P Sch : Patrol	3.09	20–30%
Depr : Neurotics	4.49	10–20%
Depr : Patrol	5.06	5–10%
Patrol Anx : Patrol Non-Anx	1.83	30–50%
Patrol Sch : Patrol Non-Sch	3.93	10–20%
Patrol Anx, Non-Sch : Patrol Non-Anx, Non-Sch	1.48	30–50%
Patrol Anx, Non-Sch : Patrol Anx, Sch	2.36	30%

7. *Modified Mean Scatter: Chi^2 Test.*

For a further evaluation of the Arithmetic scatter we turn now to an analysis of the Modified Mean Scatter[81] as presented in Table 39. A survey of the frequency table, and the Chi^2 tests of significance, shows that the impairment of the Schizophrenics—which was so clear and significant on the Vocabulary Scatter—is here clear only in the Deteriorated Unclassified Schizophrenics. Apparently, while in the Schizophrenics the Arithmetic scatter from the well-retained Vocabulary was great, the Verbal subtests also drop; thus the scatter from the Verbal Mean is small. Conversely, in the Neurotics it is the percentage of cases with positive scatter that decreases significantly; their Arithmetic scores, although perhaps higher than some

---

[81] The Verbal Mean is here, as in the case of Digit Span, the mean score on the 4 essentially Verbal subtests: Comprehension, Information, Similarities, and Vocabulary.

TABLE 39-A.—MEAN SCATTER OF ARITHMETIC. *Percentage of Cases in Ranges of Scatter*

Group	No. of Cases	Percentages		
		> 0	0 to −3	≦ −4
U Sch A	17	12	64	24
U Sch Ch	13	31	54	15
U Sch D	7	14	29	57
P Sch A	11	45	45	9
P Sch Ch	10	40	40	20
P Sch D	5	20	40	40
P Co	13	8	69	23
S S	9	22	56	22
Pr C	16	25	50	25
Pr O-I	16	44	50	6
DP	8	25	62	12
DI	7	43	29	29
DSN	9	56	33	11
DN	7	—	57	43
Hy	18	17	72	11
A & D	10	20	60	20
MN	9	—	78	22
O-C	16	12	69	19
Neuras	6	67	33	—
P (1)	32	28	59	12
P (2)	17	35	47	18
P (3)	5	60	40	—
Special Groups:				
(P + U) Sch (A + Ch)	51	29	53	18
(P + U) Sch D	12	17	33	50
Depr	31	32	45	23
Depr − DN	24	42	42	16
Neurotics	59	19	66	15
Neurotics − Neuras	53	13	70	17
Patrol	54	33	54	13
Patrol Anx	36	42	50	8
Patrol Non Anx	18	17	61	22
Patrol Sch	12	42	58	—
Patrol Non Sch	42	31	52	17
Patrol Anx, Non Sch	26	37	52	11
Patrol Non Anx, Non Sch	16	20	53	27
Patrol Anx, Sch	9	56	44	—

of their Vocabulary scores, could not compete with their well-retained general Verbal level. The Patrol fares similarly.

Thus for Arithmetic the Vocabulary Scatter is a much more sensitive measure than is the Modified Mean Scatter, which seems to level out the differences. However, the difference between the Depressives and Neurotics becomes clearer on the Modified Mean Scatter than on the Vocabulary Scatter. Even the Patrol and the Neurotics can be somewhat differentiated by the Modified Mean Scatter; both show up worse on the Modified Mean Scatter than on the Vocabulary Scatter, the Neurotics more so than the Patrol.

TABLE 39-B.—*Differential Significance of Distributions*

Groups Compared	Chi^2(d.f. = 2)	Significance
(P + U) Sch (A + Ch) : (P + U) Sch D	5.40	5–10%
(P + U) Sch (A + Ch) : (Neurotics – Neuras)	4.42	10–20%
(P + U) Sch D : Depr	3.19	20%
(P + U) Sch D : (Depr – DN)	5.22	5–10%
(P + U) Sch D : Neurotics	8.95	1–2%
(P + U) Sch D : (Neurotics – Neuras)	6.66	2–5%
(P + U) Sch D : Patrol	8.31	1–2%
(Depr – DN) : DN	6.46	2–5%
Depr : Neurotics	3.82	10–20%
(Depr – DN) : (Neurotics – Neuras)	8.16	1–2%
(Neurotics – Neuras) : Neuras	10.61	<1%
Neurotics : Patrol	3.14	20%
(Neurotics – Neuras) : Patrol	6.09	2–5%
Patrol Anx : Patrol Non Anx	4.38	10–20%
Patrol Sch : Patrol Non Sch	2.47	30%
Patrol Anx, Non Sch : Patrol Non Anx, Non Sch.	2.26	30–50%
Patrol Anx, Non Sch : Patrol Anx, Sch	1.68	30–50%

8. *Analysis of the Extreme Weighted Scores of the Arithmetic Subtest.*

Finally, let us consider the distribution of weighted scores on Arithmetic, in order to evaluate the extremes of scatter.

Of the sixteen cases which, according to Special Figure 2, represent the group of extremely low weighted scores (less than 6) on Arithmetic, five are contributed by the Unclassified Schizophrenics, three by the Paranoid Schizophrenics, one by the Paranoid Conditions, and two by the Simple Schizophrenics. That is, 11—or about 70%—of these cases are contributed by the Schizophrenic groups. Four cases, or 25%, are contributed by the Depressives; one case, or 6%, is contributed by the Neurotics; and none is contributed by the Patrol.

Special Figure 3, presenting the distribution of the high weighted scores equal to or greater than 15, shows 23 such cases in our population. Of these, only 3 are Schizophrenics and 1 is a Paranoid Condition. In other words, the Unclassified

TABLE 40-A.—*Distribution of Weighted Scores on Arithmetic*

Group	No. of Cases	Percentage of Cases			
		< 6	6–9	10–13	15–17
U Sch A	17	18	12	71	—
U Sch Ch	13	8	23	62	8
U Sch D	7	29	57	14	—
P Sch A	11	9	27	55	9
P Sch Ch	10	10	20	70	—
P Sch D	5	20	60	20	—
P Co	13	8	15	69	8
S S	9	22	33	33	11
Pr C	16	—	38	56	6
Pr O-I	16	—	—	69	31
DP	8	12	75	12	—
DI	7	29	29	43	—
DSN	9	—	22	78	—
DN	7	14	43	43	—
Hy	18	—	27	67	6
A & D	10	—	30	60	10
MN	9	11	33	56	—
O-C	16	—	38	50	12
Neuras	6	—	17	83	—
P (1)	32	—	22	59	19
P (2)	17	—	24	65	12
P (3)	5	—	—	100	—
Special Groups:					
(P + U) Sch (A + Ch)	51	12	20	65	4
(P + U) Sch D	12	25	58	17	—
Depr	31	13	42	45	—
Neurotics	59	2	31	61	7
Patrol	54	—	20	65	15
Patrol Sch	12	—	8	67	25
Patrol Non Sch	42	—	24	64	12
Patrol Anx	36	—	14	69	17
Patrol Non Anx	18	—	33	56	11

Schizophrenics, the Paranoid Schizophrenics, the Simple Schizophrenics, and the Paranoid Conditions, constituting about 33% of our entire population, contribute only about 17% of the high weighted scores. On the other hand, the Patrol, constituting about 21% of our entire population, has 8 cases or about 35%. The

Neurotics contribute only half as many as the Patrol, although the two groups are approximately equal in size; of these 4 Neurotic cases, 3 come from the Obsessive-Compulsive and the Anxiety and Depression groups. Apparently concentration is best able to stand up in Neurotics with a compulsive "intellectualizing" adjustment pattern. It is especially striking that no Depressive Neurotic or Psychotic achieves a high weighted score on Arithmetic. In regard to the Patrol breakdown presented in Table 40-A, it appears that the Schizoid Patrol tends to have more high and fewer low weighted scores than the Non-Schizoid Patrol.

In summary, we might say that the Schizophrenics are meagerly represented in the high, and highly represented in the low, weighted-score ranges: in other words, they show a strong tendency for an extremely impaired concentration. The Neurotics tend to show only a mild impairment of concentration as reflected in high and low weighted scores. The Normals show the least such impairment. Table 40-B presents the differential significance of this distribution. Again the sequence of groups from the greatest to the least impairment of concentration is Deteriorated Schizophrenics, Depressives, Acute and Chronic Schizophrenics, Neurotics, and the Patrol. There is no difference between the Patrol subgroups. However, if we change the limits somewhat—as shown in Table 31—the tendency of the Schizoid Patrol to have higher Arithmetic scores than the Non-Schizoid Patrol becomes apparent.

TABLE 40-B.—*Differential Significance of Distribution of Cases*

Groups Compared	Chi^2 (d.f. = 3)	Significance
(P + U) Sch (A + Ch) : (P + U) Sch D	11.36	1%
(P + U) Sch (A + Ch) : Depr	6.07	10–20%
(P + U) Sch (A + Ch) : Neurotics	6.29	10%
(P + U) Sch (A + Ch) : Patrol	9.78	2%
(P + U) Sch D : Depr	3.12	20–30%
(P + U) Sch D : Neurotics	15.90	<1%
(P + U) Sch D : Patrol	25.96	<<1%
Depr : Neurotics	8.52	2–5%
Depr : Patrol	15.72	<1%
Neurotics : Patrol	4.00	20–30%
Patrol Sch : Patrol Non Sch	2.19	30–50%
Patrol Sch : Patrol Non Sch	10.08*	<1%

* Units changed to 0–7, 8–12, 13–17; see Table 25-C.

We conclude that concentration suffers most in the Schizophrenics, and is well-retained in the Patrol. It suffers nearly as much in the Depressives as in the Schizophrenics, though not as much in the Depressive groups as in the Deteriorated Schizophrenics. The groups characterized by intellectualizing tendencies—that is, the Obsessives and Over-Ideational Preschizophrenics—and also the Schizoid Normals are represented with great percentages in the high and highest ranges of weighted scores.

9. General Diagnostic Conclusions:

(a) Failures on the easy Arithmetic items are most frequent in Deteriorated Schizophrenics and Depressive Psychoses. To a lesser extent, such misses occur in other Schizophrenics and Depressives, and are rare or absent in Normals and Neurotics. These same trends hold true in general for the Arithmetic items of second degree of difficulty.

(b) Great drops of the Arithmetic score below the Vocabulary score are most frequent in Deteriorated Schizophrenics and Depressives. It appears to be a special feature of the Unclassified Schizophrenics to tend to have greater impairment of Arithmetic than of Digit Span.

(c) Severely impaired Arithmetic scores may in general be measured best from the Vocabulary level, since such low scores occur mainly in those groups which show a lowering of the essentially verbal scores as well. Scatter from the verbal mean is to some degree effective in showing a mild impairment of the Arithmetic score in the Neurotics.

(d) Low weighted scores occur most frequently in the Schizophrenics and the Depressives. High weighted scores tend to occur in the "intellectualizing" clinical groups and in the Normals. Within the Normals, the schizoids especially tend to have such high scores.

(e) The fact that the greatest impairment in Arithmetic occurs in Schizophrenics and Depressives would seem to support the general theoretical considerations advanced in the beginning of this chapter.

L. PICTURE ARRANGEMENT

1. Introduction. The Picture Arrangement subtest[82] is a Performance subtest; that is to say, in it the test problem is not merely verbally put and verbally answered. It is one of those Performance subtests in which the motor action is of a non-essential kind, requiring merely a change of position of cardboard squares so that the pictures on them make a meaningful story-sequence. The visual presentation of the material is, however, an integral part of the non-verbal or performance nature of the subtest. In this respect it is similar to the Picture Completion subtest. The pairing of these two subtests is justified by their great vulnerability, evident in Special Table 3; of all the subtests, these show the lowest mean scores for our total population.

---

[82] The Picture Arrangement subtest consists of a sample demonstration and 6 test items:

(Sample) 3 pictures about a bird and its nest, showing the building of the nest, eggs in the nest, and the bird feeding the young that have been hatched.

(1) 3 pictures about the building of a house, showing the foundation, the construction of the frame, and the painting of the finished exterior. The time limit is one minute; only the correct sequence gets credit.

(2) 4 pictures about a hold-up and its consequences, showing the hold-up, the arrest by a policeman, the courtroom scene, and the thief imprisoned. The time limit is one minute; only the correct sequence gets credit.

(3) 4 pictures about a rising street-elevator, showing the ringing warning-bell, two stages in the ascension with the gradual appearance of figures, and the figures leaving the elevator platform. The time limit is one minute; only the correct sequence gets credit.

In the following treatment of Picture Arrangement, it will be assumed that it is a test of "planning ability" and "anticipation".

2. The Psychological Rationale of Picture Arrangement.

(a) Planning and Anticipation. Planning ability is a concept very rarely used in psychiatric or psychological terminology. Even in common sense usage it is a rather infrequent term. Only in assessing executive abilities is this or equivalent terms used with relative frequency. It is rather surprising that the term and its psychological implications have been so little explored, especially since the function referred to appears to be one of our most human qualities. K. Buehler (4), endeavoring in his volume on child development to characterize human thinking as contrasted with that of animals, uses the following illustration: we do not build bridges and then test whether or not they can carry the weight we want them to; rather, we sit down at our desk and plan how to build a bridge that will carry that weight. We might paraphrase Buehler's idea as follows: we do not build bridges by trial and error, but by anticipating and planning the future.

This most human ability of anticipating and planning was found clinically, for instance, to be strikingly deficient in the Korsakow syndrome (5). The "anticipation" concept is central to Selz's (26) rarely read and otherwise outdated work on "ordered thinking". Otherwise, the concept of *Einstellung*, of the German schools of the "psychology of thinking", is the only concept developed by psychologists which is analogous and pertinent to the concept of "planning ability". It is well-known that these schools of the "psychology of thinking" were the first to declare war upon association psychology in their explanation of the nature of thinking. They first realized that the emergence of the next link in a chain of thoughts is not due to a process of mechanical association, in which the earlier link in the chain brings the next one into consciousness by virtue of having frequently occurred together with it in the past, in spatial or temporal contiguity; but rather to an *Einstellung* which is activated by the earlier link in a chain of thought and which performs a function of selecting, out of all the available memory material, that which is most "appropriate" in the situation. In other words, the sequence of ideas in ordered thinking is determined by selective anticipation and not by mechanical association.[83]

---

(4) 5 pictures about a flirtation, showing the "Little King" riding in his chauffeured limousine, a washerwoman walking in the street, the King noticing her, getting out of his limousine, and finally carrying her bundle for her. The time limit is two minutes; partial credit is allowed for sensible minor variations of this sequence.

(5) 6 pictures about a fishing experience, showing the "Little King" waiting for a catch, getting one, waiting again, getting another catch, calling down toward the water, and his chamberlain emerging in a diver's suit from the water where he has been putting fish on the King's line. The time limit is two minutes, with extra credit for quick solutions; partial credit is allowed for sensible variations in this sequence.

(6) 6 pictures dealing with an embarrassing moment, showing a man carrying a dress model under his arm, hailing a taxi, sitting in the taxi with the model propped against him, looking back through the rear window, blushing with the realization that it appears from behind that he is "cuddling" with a real woman, and finally putting the model over to the other side of the taxi seat, out of contact with him. The time limit is two minutes, with extra credit for quick solutions; partial credit is given for sensible variations in this sequence.

The existence and significance of the function of *Einstellung* or "anticipation" is vouched for by common human experience in the process of reasoning or even of free conversation, when although we do not yet have the next idea in consciousness we nonetheless "feel" in what direction it lies.

Like the concept of "judgment" discussed in the section on the Comprehension subtest, the concept of "planning ability" is also one on the borderline of the concepts couched in "intellectual" and those couched in "emotional" terms. The difference appears to be that while judgment appears to refer more to a situation here and now given, planning ability and anticipation appear to refer rather to a *sequence* extending into the future; thus they imply a temporal factor.[84] *Einstellung*, a concept analogous with that of "attitude" or "set", is of a more clearly emotional and less rationalistic character than the latter.[85] Further, the efficacy of *Einstellung* or anticipation is dependent upon the individual's width of experience over which the *Einstellung* or anticipation exerts its selective function.

Planning ability is thus partly a function of emotional adjustment, making for emergence of the proper anticipation or *Einstellung;* and partly of the width of experience which is at the disposal of the individual and is to be mobilized by these anticipations.

(b) The Rôle of Planning Ability and Anticipation in Picture Arrangement: Examples. The relationship of the Picture Arrangement subtest to planning ability is in need of clarification. No doubt there is a great difference between arranging a series of pictures into a story-sequence and planning one's own life-endeavors, the layout of a business organization, or only a day's over-filled schedule or one's moves in a chess game. But if we will recall what is requisite to a simple conversation—which might well serve as the simplest pattern of planning—we are much reminded of organizing a series of isolated pictures into a sequence. For a conversation between two persons not to become stagnant, the prerequisite is that each person get the implications of the other's statements and anticipate the direction his ideas are taking. This is true not only for conversation, but even for the simple reading of a sentence. We read not by reading every word singly and putting them together; rather, when a sentence starts with a "though", it awakes in us an anticipation of a sentence structure or pattern of antithesis, into which we shall integrate—or which shall define our integrating, organizing, and giving meaning to—the verbal content of the rest of the sentence. If we do not anticipate, we do not understand what we read.

---

[83] It appears superfluous to demonstrate here that the concepts of "anticipatory responses" in conditioning [See e.g., Marquis and Hilgard (15)] are mechanical conceptions only very indirectly pertaining to the function here discussed.

[84] There appears to be an intimate relationship between the temporal factor implied in anticipation and that which has been called in recent psychological literature "time perspective" [See e.g., Frank (8)]. Particularly in connection with level of aspiration experiments [See in this connection Escalona (7)] the concept of time perspective has become significant. Both anticipation and time perspective appear to be intimately connected with the general problem of time experience, a problem of psychology which is of utmost importance and has been badly neglected. For a summary of the contributions of psychopathology to the understanding of the background of functioning of time sense, see Rapaport (22), Chapter IX.

[85] The rôle of *Einstellung*, attitude, and emotional factors in general has been discussed by Rapaport (22) in reference to memory functioning. Indications will be found there as to the applicability to thought processes of the considerations which were advanced concerning memory. A theoretical exploration or, even more, systematization of the rôle of such factors in thought processes is still lacking.

On the Picture Arrangement subtest, we submit that the subject's achievement is a reflection of his ability to anticipate the consequences of initial acts or situations, and hence is a reflection of his planning ability.

A few examples will show clearly how disturbances in anticipation make planning impossible, and result in failures on Picture Arrangement. These failures may be due either to lack of anticipation and/or to false anticipation determined by overvalent ideas.

First we shall give a full presentation of the Picture Arrangement performance of an Ambulatory Schizophrenic, who at first sight presented an "obsessional" picture. After the sample "bird-nest" series was shown to him, the three pictures of building a house were put before him; this patient then asked, "Can I switch them around?", indicating that from the sample demonstration he had formed no anticipation of the test proper.

In the first and easiest item—the building of a house—he was not able to anticipate the story, and actually tried all possible combinations of sequence before he was able to decide on the correct one. The inability to plan or to anticipate was thus again indicated.

The second item—the story of the thief—took the patient two minutes, and finally he decided on an incorrect sequence; that is, he put the picture of the thief imprisoned before the picture of the courtroom trial. Since those rare Normals who fail this item produce this sequence, one would be tempted to pass this patient's failure lightly. But, encouraged by the examiner's general attitude, the patient gave further significant information: "A man sitting on a bench outside . . . shooting another man . . ." That is, even at the end the patient was not able to explain his arrangement of the pictures. The verbalization shows that there was no anticipation from the act of shooting—to begin with a misinterpretation of the picture—to give meaning to the prisoner's striped uniform. Consequently the court scene remained altogether uncomprehended ("a man sitting on a bench outside . . .") and dangled at the end of the series as a meaningless appendage. The pictures remained isolated.

In the third series of pictures—the scene of a rising elevator—the patient came to the right solution, but so late that he did not get credit for it; and with some disgust he said, "I don't know what it is", altogether failing to recognize that he had reached a solution and that the solution was correct. This series of pictures can be arranged simply by following the gradual rising of the angle of the door of the elevator from one picture to another, without reference to the meaning of the picture. Some feeble-minded persons and some children do verbalize this procedure clearly. In this patient the procedure remained unverbalized, and we find only the negative of it: "I don't know what it is."

The fourth series—the car-ride and flirtation of the Little King—brought to expression certain devious anticipations rooted in the pathological ideas of the patient. He came to no arrangement, failing the item totally; but while working he said, "What is it? . . . Nigger riding in a motorcar? . . . or getting married? . . . a policeman? . . . I can't make it out." There are three features in this verbalization: the first and most outstanding is that the car-ride in the presence of a woman makes for the anticipation of "getting married"; the second is the direct failure to identify the man's figure, but rather the black hair of the woman is misidentified as a "nigger" and the anticipation makes the Little King a "nigger"; the third is that the uniform-cap of the chauffeur is misidentified as a policeman's cap, either contributing an anticipation resulting in the "nigger" misidentification or being itself determined by an anticipation based on the "nigger" misidentification. It is understandable that under such conditions, where ideas, percepts and anticipations are present in isolated, piece-meal form without integration, no order can be brought into the series of pictures.

Devious anticipations became even clearer in the last two series. In the fifth series the patient, who is very familiar with fishing, said, "Fishing obviously . . . looking very much alike, all these . . . don't see much difference in them". The familiar idea of fishing was so rigidly associated with all the pictures that it made superfluous any further connections or anticipation of any progression: all the pictures appeared alike to him, because only one idea was mobilized by them—that of his favorite sport, fishing.

Finally, the sixth series—the car-ride with a statue—was put into a sequence which was a partial solution, meriting a score of 1. This score was spurious because the patient said, "Riding—kissing, this is obviously a petting . . . whatever these eyes in the back of his head mean . . ." The overvalent idea of the patient—sex preoccupation—and lack of anticipation from one picture to another made it impossible for him to recognize that the figure seen with the man in the car is the statue he carried in the street, or that the man is looking back over his shoulder rather than that he has eyes in the back of his head.

We have described in detail the Picture Arrangement performance of this patient, because it shows a variety of forms in which lack of anticipation, or devious anticipations due to overvalent ideas, make for failure.

The influence of projective false anticipations, rooted in the patient's own problems and character, is shown in the responses of one very despondent and dependent Schizophrenic. In the fishing pictures this patient failed altogether, and said, "He (the King) is discouraged . . . tries again . . . has a bite . . . quits." This is the type of patient who in his own life always tries again, always fails, and readily quits. In his everyday anticipations failure looms large, and the actions of the Little King are regarded by him accordingly.

The lack of unifying anticipations is seen in the responses of a Deteriorated Schizophrenic to the sixth series, the taxi-ride with the statue: "He didn't like the lady so well . . . he got out to take the statue with him . . . his lady friend was in the taxi with him." The statue and the figure in the car are not identified with each other, which makes for a reversal of the events pictured.

We believe that these examples help bring into relief the rôle of anticipation and planning as the underlying psychological functions in the Picture Arrangement items. They also show some of the patterns of the pathology of anticipation and planning.

(c) The Relation of Picture Arrangement to "Attention" and "Judgment". The planning on the Picture Arrangement subtest implies both attention and judgment. Attention should effortlessly convey to the subject the essential features of the individual pictures, or the deviations of the pictures from each other. An effortful concentration usually becomes necessary only when the patient's sense for the outstanding is weakened, and the essential and the non-essential are apperceived with the same emphasis. It is then that effortful selective search for meaning starts. When this is the case, the patient usually gets lost in the single pictures of a series, does not come to an arrangement, comes to one late or to a wrong one predicated upon some unimportant feature of the pictures. Nevertheless, there is no statistically traceable impairment of Picture Arrangement by anxiety, as in Digit Span. The anxious and Non-Anxious Patrol do not statistically differ significantly in this respect. At present we have no explanation for this finding.

We cannot analyze here the visual organization process entering the Picture Arrangement performance; partly because it is so highly stereotyped that only in borderline intelligence, culturally alien, and psychotically maladjusted cases are obvious variants to the stereotypes seen; partly because the visual organization of complex meaningful material is a little-explored problem; and partly because the interlacing of those processes called here "visual organization" and those called here "attention" is at present altogether beyond our knowledge.

We must discuss, however, the rôle that judgment plays in the performance of Picture Arrangement. It is probable that acting upon any anticipation implies judgment. But the function in Picture Arrangement performance is more complex than that of judgment; it implies the time perspective of anticipation.

Logically one is tempted to assume that as soon as judgment is impaired, planning ability will be impaired too. This is not always the case. Psychopaths may have Comprehension scores much inferior to their Picture Arrangement scores. Several recent authors have attributed this finding to the psychopath's superior "social understanding." It is difficult to see clinically what is meant by this; but we might judge that, as far as the Picture Arrangement subtest is concerned, what is meant is good anticipation. It is possible that "planning" here becomes "scheming" and, as in dealing with specific life situations, the psychopath may here be quite shrewd. This is not contradictory to the finding that more general "life-planning" and long-range anticipations of the psychopath are poor or absent.

3. Administration. A few points of administration not enlarged upon in the Bellevue Manual should be mentioned here.

(a) Not only failures, but also the partially correct arrangements made by the subject should be recorded.

(b) The subject should not only be allowed to finish if he oversteps the time limit, but should also be encouraged to try again (without credit) after failure.

(c) In all failed items the story or anticipations conceived by the subject should be inquired into; even the passed items should be inquired into if any peculiarity of performance is seen.

(d) The story conceived by the subject on the last two items should always be inquired into; incorrect anticipations or lack of understanding frequently underlies a passing arrangement.

(e) The patient should be asked in advance to indicate when he is finished with an item; thus the examiner may be sure that he is neither arbitrarily interrupting him nor giving him a clue that he has successfully completed the item.

4. Item Analysis. The item analysis of the Picture Arrangement subtest, consisting of only six items, naturally cannot be as revealing as the item analyses of the Verbal subtests, which have in turn 42, 25, 12, and 10 items. It is likely that analysis of the time-factor would indicate a number of differences between the groups; and further studies may also prove that specific failing sequences may have clinical diagnostic significance. We dispense with these because of limited space and time. Tables 41 give the breakdown of the Picture Arrangement items into two groups; Items 1–3 constitute the easy group, and Items 4–6 the difficult group. This division was based on the achievement of the Patrol, which failed 6% of the easy items and 35% of the difficult items.

TABLE 41-A.—*Percentage of Misses on Easy and Difficult Picture Arrangement Items. Frequency*

Group	No. of Cases	Easy Items (1–3)		Difficult Items (4–6)		% of Group
		No. of Misses	% of Total Chances	No. of Misses	% of Total Chances	
(U + P) Sch (A + Ch).......	51	9	6	62	41	18
(U + P) Sch D..............	12	13	36	27	75	83
DP + DI....................	15	14	31	36	80	60
DSN + DN...................	16	3	6	22	46	19
Neurotics..................	59	11	6	46	26	15
Patrol.....................	54	10	6	56	35	19

TABLE 41-B.—*Differential Significance of Percentage of Misses on Easy Items*

Groups Compared	Chi^2 (d.f. = 1)	Significance
(P + U) Sch D : (P + U) Sch (A + Ch)..........	23.04	<<<1%
(P + U) Sch D : Neurotics.....................	23.84	<<<1%
(P + U) Sch D : Patrol........................	22.88	<<<1%
(DP + DI) : (DSN + DN)........................	8.02	<1%
(DP + DI) : (P + U) Sch (A + Ch)..............	19.19	<<<1%
(DP + DI) : Neurotics.........................	19.83	<<<1%
(DP + DI) : Patrol............................	19.00	<<<1%

In evaluating these failures one must keep in mind an objection which has repeatedly been raised against the Picture Arrangement subtest. On the level of our clinical population it is a fair test; but on the level of our control population it is too sophisticated. This control population is not one which thrives on *The New Yorker* or similar publications, to whose style the subtest drawings have great affinity; and that this is one of the few subtests on which the Patrol is hardly differentiated from some of the clinical groups may well derive from the sophisticated nature of some of these drawings. Though it is possible that this lack of differentiation derives from a common factor—such as anxiety, as in Digit Span—our clinical experience with the Picture Arrangement subtests of both the Cornell-Coxe Performance Scale and the Bellevue Scale points up the sophisticated nature of the latter. This test is therefore somewhat unfair to our Normals, since it presents them with anticipation problems stated in more sophisticated terms than those of their everyday life; but the finding that the Patrol does badly on these items is meaningful, and reflects their inadequacy for making subtle anticipations.

TABLE 41-C.—*Percentage of Cases with One or More Misses on Easy Items*

Group	No. of Cases	% Who Missed
(P + U) Sch (A + Ch)	51	18
(P + U) Sch D	12	83
DP + DI	15	60
DSN + DN	16	19
Neurotics	59	15
Patrol	54	19

TABLE 41-D.—*Differential Significance of Percentage of Cases*

Groups Compared	Chi²(d.f. = 1)	Significance
(P + U) Sch D : (P + U) Sch (A + Ch)	16.90	<<<1%
(P + U) Sch D : Neurotics	20.23	<<<1%
(P + U) Sch D : Patrol	16.58	<<<1%
(DP + DI) : (DSN + DN)	3.95	2–5%
(DP + DI) : (P + U) Sch (A + Ch)	8.46	<1%
(DP + DI) : Neurotics	11.23	<<1%
(DP + DI) : Patrol	8.15	<1%

The Patrol is not differentiated by failures on easy items from the Neurotics, Depressive Neurotics, or Acute and Chronic Schizophrenics. The two outstandingly poor groups are the Deteriorated Schizophrenics and the Psychotic Depressives; and their impairment is statistically significant.

Due probably to the combined effect of educational background and sophisticated test-material, the Patrol does worse than the Neurotics on the more difficult items, and is hardly differentiated from the Schizophrenics and Depressive Neurotics, though both these groups have a somewhat higher percentage of failures than the Patrol. On the 3 difficult items the Deteriorated Schizophrenics and Depressive Psychotics are again sharply differentiated from all the other groups.

The same results are obtained if we analyze achievement on the easy items not in terms of percentage of failures, but in terms of percentage of cases failing one or more items.

This breakdown of the Picture Arrangement items therefore does not contribute any new significant diagnostic indications, because the Deteriorated Schizophrenics and the Depressive Psychotics are also differentiated on several other subtests.

5. *Vocabulary and Mean Scatter: "t"-Test.*

The Vocabulary Scatter of all our groups on Picture Arrangement is represented in Graph 3 of Special Figure 1.

The graph indicates that the greatest scatter is found in the Deteriorated Schizophrenics and the Depressive Psychotics; the least scatter is found in the hysteric-like Neurotic groups, the Simple Schizophrenics,[86] and the Maladjusted Patrol. The obsessive-like Neurotic groups and the other psychoses take a middle position. The rest of the Patrol falls halfway between the two Neurotic subdivisions.

The statistical evaluation of the average Vocabulary Scatter represented in Special Figure 1 is given in Special Table 1. The most striking feature of the column presenting the statistical results on Picture Arrangement is that almost all the groups show a significant or nearly significant drop of Picture Arrangement scores below Vocabulary level. Thus far only Digit Span and, to a lesser extent, Arithmetic showed such a vulnerability. Thus, Picture Arrangement is among the most vulnerable of our subtests. Only three groups do not show such a trend to drop on Picture Arrangement: the Simple Schizophrenics, the Hysterics, and the Maladjusted Patrol. Excepting the Obsessive-Compulsives, who again show a tendency to be as impaired as the Schizophrenics, the Neurotic group shows only trends to have significant impairment of Picture Arrangement. Although the Well-Adjusted Patrol has a highly significant drop of Picture Arrangement, it does not drop as much as most of the clinical groups, as shown in its relatively low average Vocabulary Scatter. The significance of this drop derives from the fact that the trend toward mild impairment is consistent in most of the Patrol cases. We attribute this consistency in impairment to the lack of ability for sophisticated and subtle anticipations in most of our Patrol subjects. The same considerations hold true for the Borderline-Adjusted Patrol. It is also noteworthy that the three "intellectualizing" groups—the Paranoid Conditions, the Over-Ideational Preschizophrenics, and the Obsessive-Compulsives—all show highly significant drops of Picture Arrangement scores. This is the first subtest where such a consistent impairment for all these groups was found. This drop alone does not serve to differentiate them from other groups, since most of the groups tend to have a significant drop on this subtest; but together with the subtest scores which held up well in these groups, this Picture Arrangement finding is diagnostically very useful. These results are of theoretical importance also, showing as they do that "intellectualizing" trends are more or less ineffective for the emergence of correct anticipations.

---

[86] The reason for the special position of the Simple Schizophrenics lies again in their low Vocabulary scores, which distort their Vocabulary Scatter.

We may cross-check these trends derived from the Vocabulary Scatter by turning to Special Table 2, where the scatter of Picture Arrangement from the Performance Mean is presented. The most striking feature of this table, when compared with Special Table 1, is that none of the Depressive groups show a tendency to have Picture Arrangement scores below the general Performance Mean. In other words, the drop of the Picture Arrangement score in the Depressives is part of the uniform drop on all Performance subtest scores, and is not unique impairment. As a matter of fact, the Mean Scatter of Picture Arrangement of the Psychotic Depressives is positive, although not significantly so. These same considerations appear to hold true for the Acute and Chronic Schizophrenics. However, in these Schizophrenics the lack of significance of Picture Arrangement drop from the Performance Mean is referable to the extremely fluctuating character of their Performance achievement, which makes the Performance Mean not necessarily representative of a homogeneous Performance level. This extreme fluctuation in the Schizophrenics has already been demonstrated in the chapter on Major Scatter Patterns. We shall see later, in regard to the percentage distribution of cases into ranges of scatter, that many of these Acute and Chronic Schizophrenics do have a great drop of Picture Arrangement below their Performance level; and the Deteriorated Schizophrenics display a significant drop on Picture Arrangement even when compared to the Performance Mean. The "intellectualizing" groups show merely trends to be lower than their Performance Mean.

In general, the Performance Mean Scatter of Picture Arrangement shows fewer significant drops and fewer large mean drops than does the Vocabulary Scatter of Picture Arrangement. Not only do the average drops decrease, but in some groups the scatter from the Performance Mean even becomes positive, while the Vocabulary Scatter is negative. In other words, the Performance level is generally lower than the Vocabulary level for nearly all the groups, and thus deviations from the Performance Mean do not reflect the impairment on particular subtests as deviations from the Vocabulary level do.

The outstanding diagnostic conclusion that may be drawn from the analysis of Mean Scatter of Picture Arrangement in the various groups is that the Deteriorated Schizophrenics—which on all previous subtests have been hardly, if at all, distinguishable from the Depressive Psychotics—show a significantly poorer achievement on Picture Arrangement than the Depressive Psychotics. Specifically, the Deteriorated Schizophrenics have Picture Arrangement scores below their Performance Mean; this is not true of the Depressive Psychotics, who, as was pointed out in the section on Major Scatter Patterns, suffer a more or less uniform lowering of all Performance subtest scores. The Anxiety and Depression group, which on Picture Arrangement shows a tendency to be below its Vocabulary level, shows an equal tendency to be above its Performance level; and, to a lesser extent, this is also true of the Neurotic Depressives. We may say then that depression does not especially impair the Picture Arrangement score; and as a matter of fact, in Neurotic Depressions or in Anxiety and Depression cases, Picture Arrangement may tend to be even less impaired than other Performance subtests.

The Patrol groups are not so significantly further below their Performance level than below their Vocabulary level; but the trend is still apparent, and again reflects their poverty of cultural background and sophistication.

We conclude that (a) Deteriorated Schizophrenics can be differentiated from Depressive Psychotics by the presence in the former of negative Mean Scatter of Picture Arrangement; (b) the "intellectualizing" Paranoid Conditions, Over-Ideational Preschizophrenics, and Obsessive-Compulsives show on Picture Arrangement a great Vocabulary Scatter, for the first time; (c) of the Neurotic groups, only the Hysterics tend not to show a significant Vocabulary Scatter or Mean Scatter on Picture Arrangement.

6. *Vocabulary Scatter of the Picture Arrangement Subtest: Chi*^{2} *Test.*

For a further substantiation of the conclusions thus far derived concerning the scatter of Picture Arrangement for all the clinical and control groups, let us turn to Table 42-A, which presents the distribution of the cases of each group into ranges of Vocabulary Scatter. The Table indicates that the percentage distribution of cases follows the same trends derived from the study of the means in Special Figure 1 and in Special Table 1. The groups having the highest percentage of cases with great negative scatter are the Deteriorated Schizophrenics and Depressive Psychotics. They are followed by the other Paranoid and Unclassified Schizophrenics. The Obsessive-Compulsives again follow the Schizophrenics in pattern, and the Neurasthenics are characteristically poor. The remaining Neurotic groups do quite well, showing the lowest percentage of all the other groups. The Patrol does worse than these Neurotic groups. The breakdown of the Patrol into Schizoid, Anxious, and Depressive Normals, shows no significant differentiation. The Chi^2 tests of significance in Table 42-D support these trends. It becomes clear in these statistics that the Paranoid Schizophrenics more than the Unclassified Schizophrenics are characterized by an impaired Picture Arrangement score.

TABLE 42-A.—VOCABULARY SCATTER OF PICTURE ARRANGEMENT. *Percentage of Cases in Ranges of Scatter*

Group	No. of Cases	≧ 0	−1 to −3	≦ −4
U Sch (A + Ch)	30	27	43	30
P Sch (A + Ch)	21	10	43	48
(P + U) Sch (A + Ch)	51	20	43	37
(P + U) Sch D	12	—	25	75
DP + DI	15	13	13	73
DSN + DN	16	19	56	25
Neurotics	59	29	47	24
Neurotics—(O-C + Neuras)	37	38	49	14
Patrol	54	28	48	24
Patrol Sch	12	33	42	25
Patrol Non Sch	42	26	50	24
Patrol Anx	36	28	50	22
Patrol Non Anx	18	28	44	28
Patrol Depr	16	25	44	31
Patrol Non Depr	38	29	50	21

We conclude that great negative Vocabulary Scatter on the Picture Arrangement subtest is most characteristic for the Deteriorated Schizophrenics and the Depressive Psychotics, and, to a lesser extent, for the Acute and Chronic Schizophrenics, and the Obsessive-Compulsives.

7. Modified Mean Scatter: Chi² Test.

We turn now to Table 43-A, which presents the percentage distribution of cases into ranges of scatter from the Modified Performance Mean.[87] The Deteriorated Schizophrenics stand out from all other groups (except the Chronic Paranoid Schizophrenics and the Maladjusted Patrol) in having the greatest drop of Picture Arrangement. The Acute Unclassified Schizophrenics, the Paranoid Conditions, the Preschizophrenics, and the Patrol follow next. It is especially striking that the Paranoid Conditions and the Preschizophrenics have a high percentage of cases showing considerable impairment on Picture Arrangement in comparison to their other Performance achievements. These groups tend to have well-retained scores on the other subtests, and this specific impairment appears to be diagnostically important for them.

TABLE 42-B.—*Differential Significance of Distributions of Cases*

Groups Compared	Chi^2(d.f. = 2)	Significance
U Sch (A + Ch) : P Sch (A + Ch)	2.88	20–30%
U Sch (A + Ch) : (P + U) Sch D	8.17	1–2%
U Sch (A + Ch) : DP + DI	7.61	2–5%
U Sch (A + Ch) : Neurotics—(O-C + Neuras)	2.88	20–30%
P Sch (A + Ch) : (P + U) Sch D	2.79	20–30%
P Sch (A + Ch) : DP + DI	3.57	10–20%
P Sch (A + Ch) : Neurotics—(O-C + Neuras)	10.14	<1%
(P + U) Sch (A + Ch) : (P + U) Sch D	6.37	2–5%
(P + U) Sch (A + Ch) : (DSN + DN)	1.00	50–70%
(P + U) Sch D : Neurotics	12.65	<<1%
(P + U) Sch D : Patrol	12.15	<<1%
(DP + DI) : (DSN + DN)	7.75	2%
(DP + DI) : Neurotics	13.21	<<1%
(DP + DI) : Patrol	12.79	<<1%
Neurotics—(O-C + Neuras) : O-C	5.50	5–10%
Neurotics—(O-C + Neuras) : Neuras	4.74	5–10%
Patrol Anx : Patrol Non Anx	.26	80–90%
Patrol Sch : Patrol Non Sch	.33	80–90%
Patrol Depr : Patrol Non Depr	.58	70–80%

---

[87] Modified Performance Mean Scatter is always the deviation of one subtest score from the other four; in this case from Picture Completion, Block Design, Object Assembly, and Digit Symbol.

TABLE 43-A.—MODIFIED MEAN SCATTER OF PICTURE ARRANGEMENT.

Percentage of Cases in Ranges of Scatter

Group	No. of Cases	< -2	-2 to <0	0 to $< +2$	$> +2$
(P + U) Sch (A + Ch)	51	29	31	18	22
(P + U) Sch D	12	67	33	—	—
Depr	31	16	29	29	26
Neurotics	59	14	49	20	17
Patrol	54	35	37	15	13
Patrol Sch	12	25	42	8	25
Patrol Non Sch	42	38	36	17	10
Patrol Anx	36	33	36	19	11
Patrol Non Anx	18	39	39	6	17
Patrol Depr	16	44	25	12	19
Patrol Non Depr	38	32	42	16	11

TABLE 43-B.—*Differential Significance of Distribution of Cases*

Groups Compared	Chi^2 (d.f. = 2)*	Significance
(P + U) Sch (A + Ch) : (P + U) Sch D	8.35	1–2%
(P + U) Sch (A + Ch) : Depr	2.52	20–30%
(P + U) Sch (A + Ch) : Neurotics	5.40	5–10%
(P + U) Sch (A + Ch) : Patrol	1.55	30–50%
(P + U) Sch D : Depr	14.00	<<1%
(P + U) Sch D : Neurotics	17.51	<<<1%
(P + U) Sch D : Patrol	5.73	5–10%
Depr : Neurotics	3.53	10–20%
Depr : Patrol	6.75	2–5%
(Hy + A & D) : (MN + O-C + Neuras)	6.81**	<1%
Neurotics : Patrol	7.25	2–5%
Patrol Depr : Patrol Non Depr	1.48	30–50%

* For these Chi^2's, 3 ranges were used: ">0", "-2 to <0", "< -2".

** (Hy + A & D) had a massing of cases in the range "$> +2$", hence a special Chi^2 for a dichotomy ("$> +2$", "$\leqq +2$") was done, with a consequent 1 d.f.

The Neurotics and Depressives do best in this respect: the Neurotics tend to have mainly mild drops below their Modified Performance Mean, while the Depressives tend to have *none*. As a matter of fact, 55% of the Depressives have scores above their Modified Performance Mean. It is noteworthy that the Patrol does significantly worse than the Neurotics, again calling to our attention the lack of sophistication of our control group. A special Chi^2 test in Table 43-B shows that if the Neurotic group is broken down, the Hysteric and the Anxiety and Depression groups tend to have significantly more cases than the other Neurotics with Picture Arrangement scores well above the Modified Performance Mean.

We conclude that drops of Picture Arrangement scores well below the other Performance subtest scores occur most frequently in Deteriorated Schizophrenics. Other Schizophrenic and Preschizophrenic groups tend to drop in this respect also, as do Normals with little sophistication. Depressives in general do not suffer *special* impairment of their Picture Arrangement scores.

8. *Analysis of the Extreme Weighted Scores of the Picture Arrangement Subtest.*

Let us turn to the distribution of weighted scores on Picture Arrangement.

Special Figure 2 shows that Picture Arrangement is one of the subtests with the greatest number of cases of extremely low weighted scores below 6. There are 20 such cases, of which 7—about 35%—are contributed by the Deteriorated Schizophrenics. There are 3 other Schizophrenic cases—15%—in the group; thus, the Schizophrenics contribute about 50% of all the cases. Altogether the Neurotics contribute 15%, the Patrol 5%, and the Depressives 30%; of the latter, 25% are Depressive Psychotics and only 5%—1 case—Depressive Neurotic.

Special Figure 3 shows only 10 cases which have a Picture Arrangement weighted score of 15 or above. Of these 10 cases, only 1 is a Schizophrenic (Acute Unclassified). There is 1 Paranoid Condition, 4 Preschizophrenics[88], 1 Hysteria, and 3 Patrolmen.

In general, it is indicated that Picture Arrangement is very sensitive and easily subject to impairment; thus, a relatively great number of low weighted scores and a relatively small number of high weighted scores may be expected on it.

Table 44 presents the differential significance of the distribution in the various groups of cases having low, intermediate, and high weighted scores on Picture Arrangement. The limits of what should be considered high and low weighted scores were somewhat modified to allow for greater representation at the extremes, and thus to facilitate the differentiation of groups. These Tables again reaffirm the trends thus far noted in all previous statistical analyses of Picture Arrangement scores. The Deteriorated Schizophrenics and the Depressive Psychotics tend to have the overwhelming bulk of their cases in the low weighted score range; the Acute and

---

[88] We have seen in Part 7 of this analysis that the Preschizophrenics tend to do poorly on Picture Arrangement as compared to the other Performance subtests. The presence of extremely high weighted scores in these groups shows that their generally excellent retention of intellectual efficiency may in some cases extend even to Picture Arrangement, although it apparently offers greater difficulties to them.

TABLE 44-A.—*Distribution of Weighted Scores on Picture Arrangement*

Group	No. of Cases	Percentage of Cases		
		0–7	8–12	13–17
(P + U) Sch (A + Ch)	51	33	49	18
(P + U) Sch D	12	83	17	—
DP + DI	15	80	20	—
DSN + DN	16	31	44	25
Neurotics	59	8	68	24
Patrol	54	19	54	28
Patrol Anx	36	17	56	28
Patrol Non-Anx	18	22	50	27
Patrol Depr	16	19	56	25
Patrol Non-Depr	38	18	53	29

TABLE 44-B.—*Differential Significance of Distributions of Cases*

Groups Compared	Chi^2(d.f. = 2)	Significance
(P + U) Sch (A + Ch) : (P + U) Sch D	10.23	<1%
(P + U) Sch (A + Ch) : (DP + DI)	10.64	<1%
(P + U) Sch (A + Ch) : Neurotics	10.56	<1%
(P + U) Sch (A + Ch) : Patrol	3.56	10–20%
(P + U) Sch D : Neurotics	34.36	<<<1%
(P + U) Sch D : Patrol	19.99	<<<1%
(DP + DI) : (DSN + DN)	8.32	1–2%
(DP + DI) : Neurotics	35.37	<<1%
(DP + DI) : Patrol	20.97	<<<1%
(DSN + DN) : Neurotics	6.21	2–5%
(DSN + DN) : Patrol	1.23	50–70%
Neurotics : Patrol	3.19	20%

Chronic Schizophrenics and the Depressive Neurotics have about one-third of their cases in the low weighted-score range; the Patrol and the Neurotics do better than any of these groups, although the Patrol does somewhat worse than the Neurotics. It is noteworthy that among the Deteriorated Schizophrenics and the Depressive Psychotics, no case has a high weighted score on Picture Arrangement. The table of significances in general bears out these trends.

We conclude that low weighted scores on Picture Arrangement occur in nearly all of the Deteriorated Schizophrenics and Depressive Psychotics; and, to a much lesser extent, in the other Schizophrenics and Depressives. The Neurotics again show up best of all our groups.

9. General Diagnostic Conclusions.

(a) The Depressive Psychotics and the Deteriorated Schizophrenics are distinguished from all the other clinical groups by their significant tendency to have failures on the easy Picture Arrangement items, by their significant tendency to have Picture Arrangement scores well below their Vocabulary level, and by their tendency in general to have low weighted scores on Picture Arrangement. This same trend, though to a much lesser extent, is present in the Acute and Chronic Schizophrenics, and the Depressive Neurotics.

(b) The Depressives may be distinguished from the Schizophrenics—and especially the Depressive Psychotics from the Deteriorated Schizophrenics—by the fact that the Schizophrenics show a special impairment of Picture Arrangement in comparison to the other Performance subtests; this is not the case for the Depressives.

(c) Normal subjects with a poor cultural background and a consequent lack of sophistication show a trend to do poorly on Picture Arrangement.

(d) Preschizophrenics and Paranoid Conditions, who on the Verbal subtests stood up well, show here a trend toward impairment.

M. PICTURE COMPLETION

1. Introduction. The Picture Completion subtest of the Bellevue Scale consists of 15 drawings; an important element is missing in each drawing.[89]

---

[89] The 15 pictures of the Picture Completion subtest are the following:

1. A profile view of the head of a woman, with the line representing the bridge of her nose missing.
2. A front view of the head of a man, with one half of his moustache missing.
3. A profile view of the head of a man, with his ear missing.
4. A card labeled the nine of diamonds, with the center diamond missing.
5. A crab, with one of the hind legs on the left side missing.
6. A profile view of a pig, with the tail missing.
7. An ocean liner, with the smokestack missing, but the smoke is faintly represented.
8. A door, with the doorknob missing.
9. The face of a watch with a clearly defined seconds-dial, with the seconds-hand missing.
10. A well-filled pitcher tilted over a glass, with the flow of water missing.
11. A woman powdering herself before a mirror, with the reflection of her arm missing.
12. A front view of the head and torso of a man wearing a coat and shirt, with the tie missing.
13. A light bulb, with the threading at the base missing.
14. A profile view of a woman, with the eyebrow missing.
15. The figure of a man facing a sun setting behind mountains, with his shadow missing.

The task of the subject is to discover what is missing. The time limit on all of these items, although they are of varying difficulty, is 15 seconds. Only the correct answer gets credit.

Special Table 3 shows that Picture Completion and Picture Arrangement are the subtests with the lowest average weighted scores for our entire population. These subtests also show considerable variability, as indicated by the high standard deviations of the averages. The low average and the variability of scores indicate the great vulnerability of these subtests.

Vulnerability appears to be a more prominent feature of Performance subtests than of Verbal subtests; this is certainly true for Picture Completion. Qualitative analysis of these subtests points to the performance nature of the tasks, since verbalization plays no significant rôle. However, Picture Completion and Picture Arrangement have been qualitatively segregated from the other three Performance subtests; these two require only visual activity, while the other three require a delicate interplay of visual and motor activity, where the motor activity is essential. In the following discussions Picture Completion will be considered as a test of "visual concentration".

2. The Psychological Rationale of Picture Completion. We attempted to show in the section on Arithmetic that the function underlying achievement on Picture Completion is concentration acting upon visually-perceived material.

It could be argued that the function involved is merely effortless attention. The time-pressure is an argument against this. Furthermore, given the meaning of the pictures, which of course are recognizable to the average subject of our civilization, the task is to discover an inconsistency—the missing of a part—in this meaning. The discovery of inconsistency or consistency—the appraisal of *relationships* in a limited time—is one essential characteristic of the function here referred to as concentration.

It could be argued that this is merely another type of information test, depending on the patient's intimate and accurate knowledge of the pictured objects. But for the average person of our civilization most of these items do not require any special kind of information, but rather *common* information from everyday life. Experience indicates that reference to lack of information by the subject is a guise for faltering concentration, and usually a source of failure. A survey of the pertinent experience will elucidate the point. Reference to lack of knowledge is made by patients almost exclusively on No. 4 (the playing card), No. 5 (the crab), No. 7 (the ship), and No. 13 (the light bulb). On the crab some patients say, "I wouldn't know—I never saw a crab"; but the fact is that living creatures are as a rule symmetrical, and a concentration on the picture readily shows the asymmetry caused by the missing leg of the crab; and inquiry about playing cards usually reveals that the subject knows that the dots and numbers on them are supposed to correspond to each other. In other words, checking of parts of the picture with knowledge extant would have brought about the solution. The reference to lack of knowledge here is merely a guise for impaired concentration. It is likely that many psychologists will consider the deficient function here to be "reasoning". It is difficult to argue against this point of view, because what is here called concentration is the kernel of all reasoning. We prefer to consider reference to inconsistencies in common patterns as concentration; and to reserve the concept of "reasoning" for the more complex processes which are characterized by the interaction of attention, concentration, possibly anticipation, concept formation, and so on.

The importance of information in connection with the lightbulb and the ship usually is of a different character. The patients will say, "There seems to be something wrong with the filament—but I never did look carefully at one"; or "The sails are funny, but I don't know enough about sailboats". Here the reference to lack of knowledge is a source of their failure. They really believe that they have found *where* something is missing but do not know *what* it is. It is true that knowledge of bulbs or sailboats would help in such cases by telling the patient that he is on a wrong track, but this rôle of information is of a definitely secondary nature: many people who have never seen a real boat and know little about filaments do pass these items, by discovering the obviously missing threading and the missing smokestacks indicated by the smoke-line.

How a query for information replaces concentration and defeats the subject is clearly shown in an obsessional patient of orthodox Jewish rearing who on No. 6 asked, "Do pigs have tails?" Apparently he had discovered that the missing element was the tail; but instead of relying on the result of this scrutiny, as a good obsessive doubter he wanted the approval of information—which probably due to his rearing he did not have.

The consideration of the rôle of information in the performance on this subtest leads us to the description of other types of failure. It will be of interest to analyze these because Picture Completion is the first subtest we have considered of a type to which the Rorschach Test and, to some extent, the Thematic Apperception Test also belong—that is, tests where the identifying of visually-perceived material plays a rôle.

In general, the failures can be divided into two groups. The first is characterized by the subject experiencing the picture as unfamiliar, strange, or incorrect. We shall term this type of difficulty "increase of distance" from the picture. The failures are verbalized thus: "I don't know what it (crab) is supposed to be", or "Is it a lightbulb or what?" If it is conceded that concentration is an effort at meaningful intake of stimulation from the outside world—that is to say, a safeguard for keeping contact with reality—then impairment of concentration is impaired contact with reality. Familiarity with things is a sign of contact; an ability to recognize some familiar features in the unfamiliar is one of the main characteristics of the human being, as long as contact with reality is unimpaired. A psychotic expression of "increase in distance" from the picture was given by a schizophrenic young man who had fought with the Commandos in Crete and had been evacuated to Egypt. On the 15th picture—the man facing a sun setting behind mountains—he said, "Sun setting by the pyramids." Here it is probable that over-valent affects and ideas so encroached upon visual organization that the picture itself was not correctly apperceived and understood; or in other words, the subject had not actually come to grips with the objective meaning of the picture. The loss of reality testing in this patient came to clear expression in this response.

The second type of failure is characterized by the subject's loss of appreciation that he is dealing with a *sketched* picture and not with the real thing; here the picture is taken too literally. Accordingly the question, "What is missing?" is taken to refer not to a missing element of a drawing but rather to reality as the subject would imagine or want to have it; in other words, he is considering as missing something which was not *intended* to be in the drawing, but which he would have to have there in a corresponding real situation. We shall refer to this type of failure as "loss of distance" from the card.

Thus a Chronic Paranoid Schizophrenic, with an otherwise well-retained "front", said about the pig, "No food in the pen". Another Chronic Unclassified Schizophrenic said about the man without the shadow, "The road is missing." Another Schizophrenic said, "No crew on the ship." An extreme form given only by very disorganized subjects is to state of any profile that "the other eye is missing"—a response that is the pathological counterpart of those drawings of preliterate peoples and children who put both eyes into the profile drawing.[90] A mild and, even in Normals, frequent abortive form of this type of failure is where the picture of the woman at the mirror is responded to by naming missing parts which obviously were not intended to be drawn there. Other forms of this type of failure which may occur on a low cultural level, but which sometimes serve as psychotic indicators, are the responses pointing out minute gaps in the sketched lines or the undrawn bodies of heads as the missing parts.

3. Administration. A few points of administration not specifically enlarged upon in the Bellevue Manual should be stated here.

(a) The handling of the stopwatch should be such that—although no verbal instruction to this effect is given—the subject will have no doubt that he is being timed, and that speed is expected. The examiner can ascertain the correctness of his technique by inquiring after completion of the test into the subject's impression of what was expected of him. If the technique is correct, such reports of subjective experience will include the idea of speed expected. The examiner's certainty of the correctness of his technique is of great importance, because it can serve as a baseline for considering *characteristic* all performances which reveal a disregard for speed.

---

[90] See Heinz Werner (31).

(b) Wechsler's instruction to allow patients to finish the items even if the time-limit is overstepped should be interpreted to mean not only that some answer should be obtained, but also that false answers should not be accepted and that new answers should be asked for. Such a procedure, as well as inquiry into peculiar answers, will bring to the fore many characteristic features of the subject's perception and its elaboration, which will be diagnostically useful; and will generally develop the examiner's frame of reference for qualitative appraisal.

(c) It should be noted that the weighted score scale of Picture Completion extends only from 0 to 15, and not over the whole weighted score scale from 0 to 17. This is not only a structural shortcoming of the Bellevue Scale but may to some degree vitiate the general equivalence of weighted scores when the subject is in the highest weighted score range.

(d) It is recommended that the verbalization of each response, except those consisting of the standard one- or two-word answers ("smoke-stack", "doorknob") be recorded, whether or not the response seems correct. Similar procedure for time recording is also recommended, partly because responses given in 1–5 seconds reveal a personal characteristic, and partly because responses missing by a few seconds are likely to be temporary inefficiencies, in which case a low score should not be evaluated as though it were caused by full failure.

(e) If a subject quickly gives a false answer, the examiner is recommended to wait silently until the end of the 15 seconds; this may indicate to the subject that he is wrong, and corrections should obtain full credit.

4. Item Analysis. Let us turn now to the breakdown of the Picture Completion subtest items into easy and difficult ones. This division of the items is based on the performance of the Patrol, which missed only 6% of the items classed "easy" but missed 39% of the items classed "difficult". Figure 16-A, Figure 16-B, and Figure 16-C represent this analysis graphically.

Figure 16-A represents the percentage of misses on the easy and difficult items. The most striking feature is that the Well-Adjusted Patrol does much better on difficult items than any of the Neurotic groups, and that the Borderline Adjusted Patrol does about as poorly as the Neurotic groups. We frequently found in the item-analysis of the other subtests that on the difficult items the Patrol tended to do worse than the Neurotics; but here even the not-well-adjusted part of the Patrol does as well as or better than the Neurotics. In our previous analyses we generally interpreted this inferiority of the Patrol as representative of their poor cultural background. Thus the visual concentration brought into play on Picture Completion appears to be a factor relatively independent of the cultural background of the subject. In a sense, this finding offers support for our contention that this is a test requiring primarily concentration and not information, since wealth of cultural background appears to affect the results hardly at all.

Diagnostically more significant, however, is the graphline representing the percentage of misses on the easy items. It is apparent that the Deteriorated Unclassified

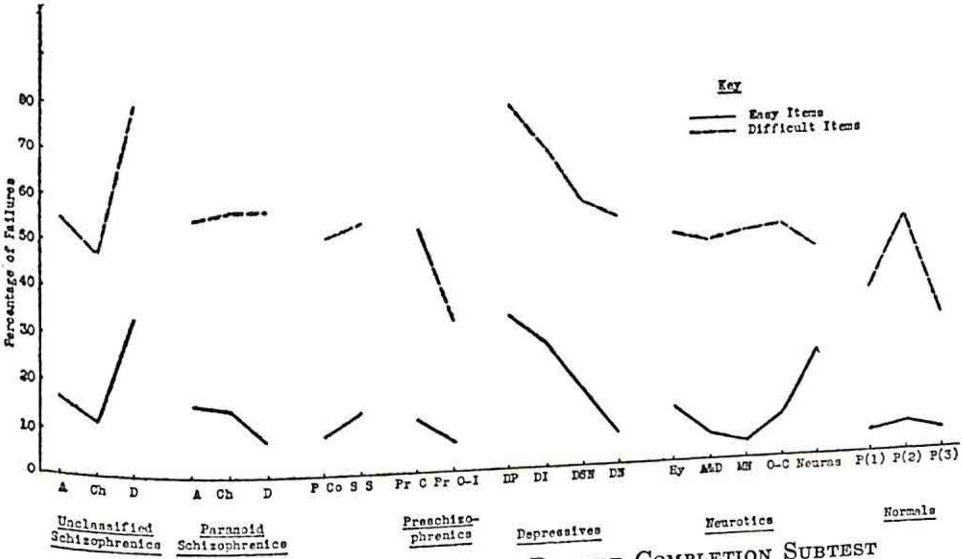


FIG. 16-A.—ITEM ANALYSIS OF THE PICTURE COMPLETION SUBTEST
Percentage of Items Failed at Each of the Two Degrees of Difficulty in All Groups

Schizophrenics and the Depressive Psychotics show the greatest tendency to fail these easy items. Only the Neurasthenic group, which as we have seen does poorly on all the subtests, comes close to them. While the Deteriorated Unclassified Schizophrenics and the Depressive Psychotics tend to miss about 30% of the easy items, the Acute and Chronic Schizophrenics miss about 10–20%, the Neurotics miss about 5–12%, and the Patrol misses only 6%. The first indications of a hierarchy of increasing impairment on Picture Completion become apparent here.

These trends are more clearly represented in Figure 16-B, which presents the percentage of failures on the easy and difficult items for 5 major combined clinical groups: namely, the Acute and Chronic Schizophrenics, the Depressive Psychotics, the Depressive Neurotics, the Neurotics, and the Patrol. The graphline representing percentage of failures on the easy items shows that many more misses on easy items occur in the Psychotic Depressives than in any of these other major groups, and that the Patrol tends to have fewest. The same pattern is followed in regard to failures on the difficult items. The parallel course of these two graphlines reemphasizes that this subtest is apparently not affected—at least not to the same degree as the others—by cultural background.

In Figure 16-B is also represented the percentage of *cases* of each of these major combined groups who miss two or more easy items. If this graphline is compared to the graphline representing the percentage of failures by each group on easy items. it is striking that the Patrol shows an equal percentage of items failed and of cases failing two or more items. All the other groups show a much higher percentage of cases failing two or more items than they show percentage of failures. In other words, it appears that few failures on easy items occur in Normals and that they occur in few cases; while in contrast, the clinical groups have a much greater prevalence of cases failing two or more easy items. This is an important diagnostic finding, showing how especially discriminating Picture Completion is between normal adjustment and neurotic or psychotic maladjustment. The hierarchy again becomes evident: about one out of every two Depressive Psychotics will have failures on the easy items; one out of every three or four Acute or Chronic Schizophrenics; one out of every four or five Neurotics or Depressive Neurotics; and only one out of about every fifteen Normals.

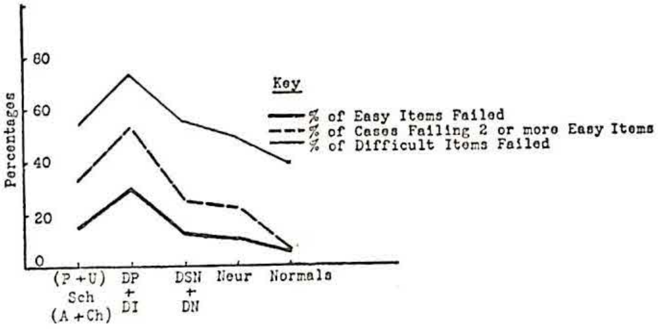


Fig. 16-B.—Picture Completion Item Analysis
Percentage of Failures in the Major Groups

Tables 45 present the differential significance of the frequencies thus far discussed; it shows that all these differences are significant below or very much below the 1% level, if the analysis is in terms of percentage of failures. If the analysis is in terms of percentage of *cases* having two or more failures, the differences between the groups become obscured except for the Patrol, which is more or less clearly differentiated from all other groups by the low incidence of such cases in it. This loss of significance in shifting from percentage of failures to percentage of cases failing implies that the failures in the poorly performing groups tend to be massed in only some of the cases. Diagnostically, for the examiner this massing of failures becomes an important indicator.

Before proceeding to the analysis of the scatter of weighted scores, we must consider Figure 16-C, which presents an analysis of the failures on each of the 15 items. The graph consists of two parts: one representing the failures on the easy items, and one those on difficult items. There are five graphlines in this figure, representing the major combined groups. Figure 16-C shows that there are internal discrepancies within each item group.

If one looks at the graphlines representing percentage of failures on the easy items, one notices three peaks occurring for all the groups represented. These peaks—great percentages of failures—occur on Items 3 (the missing ear), 8 (the missing doorknob), and 10 (the missing flow of water). These items therefore appear to be especially sensitive to impairment in our clinical groups, and even to a slight extent in our Normal groups. The Normals,

TABLE 45-A.—*Percentage of Misses on Easy and Difficult Picture Completion Items*

Group	No. of Cases	Percentage of Misses on:		% of Cases Missing 2 or More on Easy Items
		Easy* Items	Hard** Items	
(P + U) Sch (A + Ch)	51	15	53	33
DP + DI	15	30	74	53
DSN + DN	16	12	55	25
Neurotics	59	11	49	22
Patrol	54	6	39	6

* Items 1, 2, 3, 6, 8, 9, 10, 12.

** Items 4, 5, 7, 11, 13, 14, 15.

TABLE 45-B.—*Differential Significance of Percentage of Misses on Easy Items*

Groups Compared	Chi^2(d.f. = 1)	Significance
(P + U) Sch (A + Ch) : U Sch D	11.24	<<1%
(P + U) Sch (A + Ch) : (DP + DI)	14.07	<<1%
(P + U) Sch (A + Ch) : Neurotics	4.11	2–5%
(P + U) Sch (A + Ch) : Patrol	20.73	<<<1%
U Sch D : Neurotics	26.18	<<<1%
U Sch D : Patrol	48.70	<<<<1%
(DP + DI) : (DSN + DN)	11.79	<<1%
(DP + DI) : Neurotics	30.87	<<<1%
(DP + DI) : Patrol	58.26	<<<<1%
(DSN + DN) : Patrol	7.55	<1%
Neurotics : Patrol	7.14	<1%

however, have significantly fewer failures even on these items than on any of the difficult items. In other words, when misses occur in clinical groups on the easy items, they are most likely to occur on Items 3, 8, and 10. The relative difficulty in visual organization of these three items becomes clear when they are compared with the missing half moustache or missing nose.

A similar discrepancy exists for three of the difficult items. This is seen in the Patrol, which has a much higher percentage of failures on these than on the other items. The items are 5 (the crab with the missing leg), 11 (the missing reflection in the mirror), and 14 (the missing eyebrow). It will be recognized that the failures on the latter two are connected with relatively greater difficulties in visual organization. The difficulty associated with Item 5, the crab picture, is harder to understand. It appears to be a most sensitive item for a test of concentration. Superficial information cannot supplant concentration; many persons do not know how crabs really look, and the effort to replace concentration by calling upon memory and information merely slows up the subject and makes him fail. We do not intend to dispute the fact that information may enter into such items as the nine of diamonds (4), the ship (7), the lightbulb without threads (13), and the crab with the missing leg (5). We do assert that information is not the essential factor; and when we test whether the subject did or did not have the necessary information, it is easily proven that as a rule they did have it and failed to bring it to bear. Departure from concentration on the test pictures in order to summon up visual images of similar objects seen in the past will prove detrimental rather than helpful in Picture Completion.

TABLE 45-C.—*Percentage of Cases with 2 or More Misses on Easy Items*

Group	No. of Cases	% Who Missed
(P + U) Sch (A + Ch)	51	33
DP + DI	15	53
DSN + DN	16	25
Neurotics	59	22
Patrol	54	6

TABLE 45-D.—*Differential Significance of Percentage of Cases*

Groups Compared	Chi^2(d.f. = 1)	Significance
(P + U) Sch (A + Ch) : U Sch D	2.22	10–20%
(P + U) Sch (A + Ch) : (DP + DI)	1.19	20–30%
(P + U) Sch (A + Ch) : Neurotics	1.25	20–30%
(P + U) Sch (A + Ch) : Patrol	11.44	<<1%
U Sch D : Neurotics	5.47	2%
U Sch D : Patrol	18.63	<<<1%
(DP + DI) : (DSN + DN)	1.57	20–30%
(DP + DI) : Neurotics	4.19	2–5%
(DP + DI) : Patrol	16.49	<<1%
(DSN + DN) : Patrol	3.76	5–10%
Neurotics : Patrol	4.90	2–5%

We conclude that (a) only in Depressive Psychotics and Deteriorated Unclassified Schizophrenics do most of the cases show many failures on the easy items; (b) Acute and Chronic Schizophrenics show such a tendency, but to a milder extent; (c) Depressive Neurotics and Neurotics show this tendency only to a very mild degree; (d) Normals do excellently on the easy items, having very few cases with more than one failure; (e) the statistically significant differences in this hierarchy from the worst groups to the best reveal theoretical as well as diagnostic implications: efficiency of this type of intellectual function becomes more and more impaired as one goes from Well-Adjusted Normals, at one extreme, to the severe and/or deteriorated psychoses, at the other. The one exception to this rule, the Deteriorated Paranoid Schizophrenics, presents an interesting problem, which will be considered in the discussion of the visual-motor subtests.

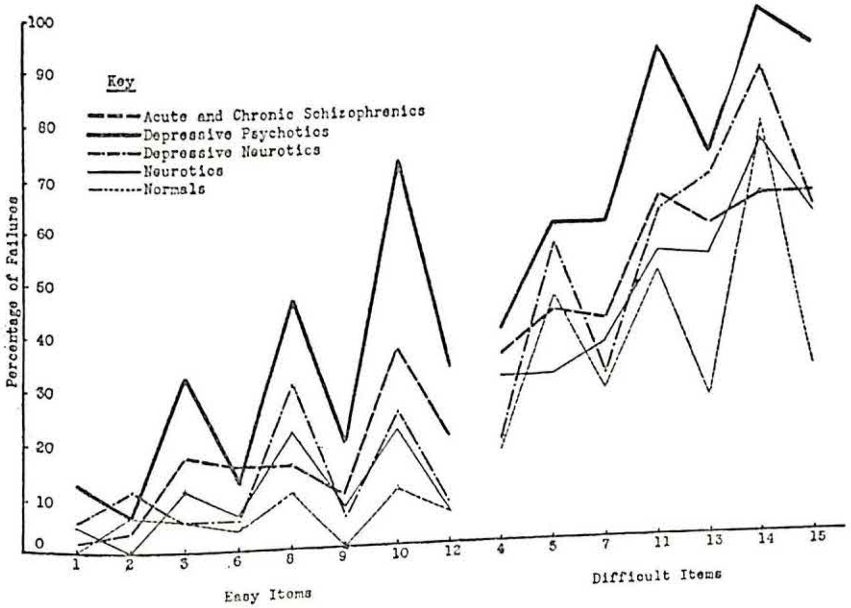


FIG. 16-C.—PICTURE COMPLETION ITEM ANALYSIS
Percentage of Failures on Each Item

5. *Vocabulary Scatter and Mean Scatter: "t"-Test.*

Let us turn now to the appraisal of the scatter of the Picture Completion scores. The average Vocabulary Scatter of each of our groups is represented graphically in Graph 4 of Special Figure 1 and numerically in Special Table 1. The graph indicates that the greatest Vocabulary Scatter occurs in the two Depressive Psychotic groups and the Unclassified Deteriorated Schizophrenics. The Acute and Chronic Schizophrenics, the Preschizophrenics, the Paranoid Conditions and the Obsessive-Compulsives—which here again follow the Schizophrenic pattern—are all on about the same level of impairment; the Depressive Neurotics and the Neurotics, other than Obsessive-Compulsives do somewhat better. It is noteworthy that the "intellectualizing" Preschizophrenics, Paranoid Conditions and Obsessive-Compulsives do not do as well on this subtest as on the Verbal subtests. This same finding is true for Picture Arrangement. Apparently these two visual subtests are refractory to improvement by "intellectualizing", and are even somewhat impaired by the presence of such a trend.

The groups showing the least Vocabulary Scatter are the Patrol and the Simple Schizophrenics.[91] The Deteriorated Paranoid Schizophrenics tend to have a surprisingly low Vocabulary Scatter which enters the range of the Neurotics, in spite of the fact that their Vocabulary scores are not too impaired. This is a finding which deserves attention, and gives us an opportunity for considerations which until now we had to forego.

The examination in Special Table 1 of the Vocabulary Scatter of the Unclassified and Paranoid Schizophrenics, divided into Acute, Chronic and Deteriorated cases, will show a trend for chronicity to impair the scores less than acuteness or deterioration. This is especially true for the Unclassified Schizophrenics. In a few instances, especially on Object Assembly, deterioration appears to be the least impairing, and acuteness the most impairing. It should be noted here that in the Paranoid Schizophrenics even deterioration does not impair seriously the achievements on Picture Completion. Our experience appears to show that, in these cases, deterioration eliminates a characteristic feature, found in Acute and some Chronic Paranoid Schizophrenics, of grasping upon some peculiar detail of the picture and thereby losing the broad survey necessary for a good response. The advantage for achievement of the general, though vague, perception found in the Deteriorated Schizophrenics will be further discussed in connection with their superior achievement on Object Assembly, where the factors at play are more palpable.

Let us turn back again to the evaluation of the statistical significance of Vocabulary Scatter. Inspection of the means and significances in Special Table 1 indicates that in general the drop of Picture Completion tends to be greater and more significant than in any other of the Performance subtests; Picture Arrangement runs a close second. The special vulnerability of Picture Completion apparently exceeds that of the other Performance subtests, which are also quite vulnerable.

The two Depressive Psychotic groups exceed in the size and the significance of their drop all the other groups. They are followed by the Schizophrenic groups, who in general are worse than the Neurotics except for the Obsessive-Compulsives; these, again following the Schizophrenic pattern, tend to be especially impaired on this subtest. Though two of the three control groups show a significant drop in Picture Completion, the extent of their average scatter is mild, and is exceeded by that of all the Neurotic groups except the Mixed Neurotics.

If we turn our attention to Special Table 2, presenting the average Scatter measured from the Performance Mean and its significance, we find some striking changes. The two Depressive Psychotic groups, which have the greatest and most reliable negative Vocabulary Scatter, show no scatter from the Performance Mean. This is true even for the Neurotic Depressives, and the Severe Neurotic Depressives even have a trend toward positive scatter. This is an important diagnostic finding, similar to that found in Picture Arrangement scatter: namely, that Depressives are not especially impaired on Picture Completion in comparison to the other Performance subtests. The great Vocabulary Scatter of these groups on Picture Completion is merely part of the uniform lowering of their Performance subtest scores. Furthermore, some of the Depressives may be less impaired on Picture Completion than on other Performance subtests.[92] We shall attempt to show later that the essential motor factor implied in the performance of Block Design, Object Assembly, and Digit Symbol causes these subtests to suffer especial impairment in Depressives. Picture Arrangement and Picture Completion imply no essential motor factor, and therefore do not tend to be especially impaired. This finding is important especially for differentiating the Depressive Psychotics from some of the Schizophrenic groups which tend to have, in general, a similar scatter pattern. These Schizophrenic groups do not suffer special impairments on motor subtests, but do on this test of visual concentration.[93]

---

[91] This low scatter of the Simple Schizophrenics is an artifact resulting from the drop of their Vocabulary score.

Turning to the Schizophrenic groups' scatter as measured from the Performance Mean, we find that only the Deteriorated Unclassified Schizophrenics retain a significant average drop. The Chronic Paranoid Schizophrenics, who showed a very significant drop from the Vocabulary level, show merely a trend to be below the Performance Mean. In other words, in those Schizophrenic groups in which Picture Completion is especially hard hit, it not only drops far below the Vocabulary level but shows a trend to drop below the level of the other Performance subtest scores also.

Of the Neurotic groups, only the Hysterics retain a statistically significant negative Mean Scatter, though this drop is smaller in extent than their Vocabulary Scatter. The Hysterics have in general a well-retained Performance level, and the drop in Picture Completion appears to be unique and relatively significant for them. The only other Neurotic group which retains as a trend the drop in Picture Completion is the Obsessive-Compulsive group. This decrease in the significance of the drop is due to the fact that Obsessive-Compulsives have a significantly lower Performance than Vocabulary level; hence, the drop of Picture Completion from the Performance level is significantly decreased.[94]

The Patrol group does not show any significant drop of its Picture Completion scores from the Performance Mean, and in fact the Well-Adjusted Patrol shows some tendency to score above the Performance average.

It is noteworthy that the Simple Schizophrenics, whose Picture Completion score was not below their Vocabulary level, show a trend approaching significance to be below their average Performance level, thereby indicating their impairment of visual concentration. It is important to stress this finding as representative of the advantage of using different scatter measures to elicit characteristic impairments and achievements of the different groups. Since their low Vocabulary level is not an effective baseline from which to estimate impairments, it remains for other scatter measures—in this case, that taken from the Performance Mean—to demonstrate specific impairment.

---

[92] This is also true of Picture Arrangement.

[93] These considerations are supported by the findings presented in the section on Major Scatter Patterns, where it was shown that the Depressive Psychotics tended to have much greater lowering of all the Performance scores than did the Schizophrenic groups.

[94] See in this connection "P−V'" scatter in the section on Major Scatter Patterns.

We conclude that (a) the Depressive Psychotics characteristically have Picture Completion scores far below their Vocabulary level, but not below the generally low level of all their Performance subtest scores. (b) The Schizophrenics also characteristically have significant drops of the Picture Completion score below the Vocabulary level, though not as great in extent as the Depressive Psychotics; they show also a tendency to drop somewhat below the Performance mean, this being especially true for the Deteriorated Unclassified Schizophrenics. (c) This pattern of a special impairment of Picture Completion below both the Vocabulary level and Performance Mean is also present in, first, the Obsessive-Compulsives, where it is merely one segment of their general tendency to follow the Schizophrenic pattern; and second, in the Hysterics, where it appears to be an isolated and specifically characteristic impairment of that group. (d) Normals in general tend to have Picture Completion scores slightly below their Vocabulary level, but not below their Performance Mean. That is, what we found in the Depressives on a very low level of subtest scores, we find in the Normals on a relatively high level. (e) The Simple Schizophrenics tend to show a drop below their Performance Mean, like the other Schizophrenics, but they have no drop below the Vocabulary level, as a result of their low Vocabulary scores. (f) The "intellectualizing" clinical groups give evidence of some impairment on Picture Completion, as on Picture Arrangement, whereas they showed little or none on the essentially Verbal subtests.

6. *Vocabulary Scatter: Chi*^{2} *Test.*

Let us turn to the percentage distribution of cases into ranges of Vocabulary Scatter in each clinical and control group. These are presented in Table 46, which shows that the most significant incidence of impairment occurs in the Depressive Psychotics and, to a lesser extent, in the Deteriorated Unclassified Schizophrenics. The Neurotics are hardly distinguishable from the Acute and Chronic Schizophrenics in Vocabulary Scatter, while the Depressive Neurotics—in contrast to the Depressive Psychotics—have a distribution which is undistinguishable from that of the Normals. However, if we exclude the Depressive Normals from the Patrol—a procedure justified by the significant difference between the Depressives and Non-Depressives in the Patrol—the incidence of impairment in the Non-Depressed Patrol is lower than in the Depressive Neurotics. The breakdown of the Patrol into Schizoids and Non-Schizoids shows that Schizoids have a trend to be somewhat worse; the breakdown in terms of Anxious and Non-Anxious Patrol shows nothing significant. Depressive trends in Normals therefore appear to be most likely to lower their Picture Completion scores. The Patrol as a whole does significantly better than the Neurotics on Picture Completion. This is true even when the most impaired Neurotic group the Obsessive-Compulsives, is excluded from statistical consideration.

We conclude that analysis of the Vocabulary Scatter on Picture Completion demonstrates a hierarchy of extent of impairment in which the different levels are differentiable statistically. From worst to best, the hierarchy is

TABLE 46-A.—VOCABULARY SCATTER OF PICTURE COMPLETION.
Percentage of Cases in Ranges of Scatter

Group	No. of Cases	Percentages		
		≧ −2	−3 to −4	≦ −5
(P + U) Sch (A + Ch)	51	47	25	27
U Sch D	7	29	14	57
P Sch D	5	80	20	0
DP + DI	15	0	20	80
DSN + DN	16	62	31	6
Neurotics	59	46	34	20
Neurotics—O-C	43	47	40	14
Patrol	54	76	19	6
Patrol Sch	12	67	17	17
Patrol Non-Sch	42	79	19	2
Patrol Anx	36	81	14	6
Patrol Non-Anx	18	67	28	6
Patrol Depr	16	69	12	19
Patrol Non-Depr	38	79	21	0

TABLE 46-B.—*Differential Significance of Distribution of Cases*

Groups Compared	Chi^2(d.f. = 2)	Significance
(P + U) Sch (A + Ch) : U Sch D	2.72	20–30%
(P + U) Sch (A + Ch) : (DP + DI)	15.42	<<1%
(P + U) Sch (A + Ch) : Neurotics	1.23	50–70%
(P + U) Sch (A + Ch) : (Neurotics—O-C)	3.40	10–20%
(P + U) Sch (A + Ch) : Patrol	11.76	<1%
U Sch D : (DP + DI)	5.12	5–10%
U Sch D : Neurotics	4.65	10%
U Sch D : Patrol	16.47	<<1%
(DP + DI) : (DSN + DN)	19.64	<<1%
(DP + DI) : Neurotics	20.61	<<1%
(DP + DI) : Patrol	40.79	<<<1%
Neurotics : Patrol	11.44	<1%
(Neurotics—O-C) : Patrol	8.80	1–2%
Patrol Sch : Patrol Non-Sch	3.34	10–20%
Patrol Depr : Patrol Non-Depr	7.61	2–5%
Patrol Anx : Patrol Non-Anx	1.63	30–50%

Depressive Psychotics, Deteriorated Unclassified Schizophrenics, Acute and Chronic Schizophrenics together with the Obsessive-Compulsives, the remaining Neurotic groups and Depressive Neurotics, the Depressive Patrol, and the Non-Depressive Patrol. This hierarchical differentiation is the clearest yet obtained, and indicates the diagnostic importance to be attached to achievement on Picture Completion.

TABLE 47-A.—MODIFIED MEAN SCATTER OF PICTURE COMPLETION.
Percentage of Cases in Ranges of Scatter

Group	No. of Cases	Percentages		
		≦ −2	<+2 to >−2	>+2
(P + U) Sch (A + Ch)	51	24	64	12
U Sch D	7	57	43	—
(DP + DI)	15	33	47	20
(DSN + DN)	16	12	75	12
Neurotics	59	32	51	17
Patrol	54	17	57	26

TABLE 47-B.—*Differential Significance of Distribution of Cases*

Groups Compared	Chi²(d.f. = 2)	Significance
(P + U) Sch (A + Ch) : U Sch D	3.86	10–20%
(P + U) Sch (A + Ch) : (DP + DI)	1.66	30–50%
(P + U) Sch (A + Ch) : Neurotics	2.16	30–50%
(P + U) Sch (A + Ch) : Patrol	3.59	10–20%
U Sch D : (DP + DI)	2.14	30–50%
U Sch D : Neurotics	2.51	20–30%
U Sch D : Patrol	8.04	1–2%
(DP + DI) : (DSN + DN)	2.77	20–30%
(DP + DI) : Neurotics (not tested, too close)		
(DP + DI) : Patrol	2.12	30–50%
Neurotics : Patrol	4.02	10–20%

7. *Modified Mean Scatter: Chi² Test.*

We turn now to the frequency distribution of the cases in each group into ranges of scatter, measured from the Modified Mean of the Performance subtests in Table 47.

The Table shows that the Deteriorated Unclassified Schizophrenics exceed all other groups in their tendency to be *especially* impaired on Picture Completion as compared with the other Performance subtests.

However, since in the Paranoid Schizophrenics, in most of the Depressives, in most of the Neurotics, and in the Patrol, the extreme positive and the extreme negative scatter counter-balance each other, the significance of differences in distribution, as presented in Table 47-B, is inconclusive. In other words, the distribution of scatter from the Modified Performance Mean in terms of percentages of cases falling into ranges of scatter becomes overlapping. Let us therefore turn to the *extremes* of positive and negative scatter as tabulated in Table 48. This Table presents the number of cases in each group having what we arbitrarily designated as extreme scatter in either direction from the Modified Mean. As the limit for the extreme scatter above, we took 2.5; as the limit for extreme scatter below, we took 3.75 weighted score units. The column presenting scatter *below* the Modified Mean shows that the greatest incidence of such cases occurs in the Schizophrenic groups; they are much rarer in the Depressives, the Neurotics, and the Patrol. 14% of the two main Schizophrenic groups, 22% of the Simple Schizophrenics, only 6% of the Depressives, only 3% of the Neurotics, and only 4% of the Normals have such specific drops in Picture Completion.

TABLE 48.—*Frequency of Extreme Modified Mean Scatter on Picture Completion*

Group	≧ +2.50	< −3.75	Group	≧ +2.50	< −3.75
U Sch A	1	2	DP	—	1
U Sch Ch	1	2	DI	2	—
U Sch D	—	2	DSN	2	—
			DN	—	1
P Sch A	3	2			
P Sch Ch	—	1	Hy	1	1
P Sch D	3	—	A & D	1	—
			MN	—	—
P Co	—	1	O-C	—	1
S S	—	2	Neuras	—	—
Pr C	2	1	P (1)	8	1
Pr O-I	—	—	P (2)	2	1
			P (3)	—	—

The differentiation between the Schizophrenics and the other groups is less clear in regard to scatter *above* the Modified Mean. The tendency of Acute and Deteriorated Paranoid Schizophrenics to have well retained Picture Completion scores, in contrast to other Performance subtest scores, comes to expression here. However, the Patrol also has a significant number of such cases, and so do two of the Depressive groups. The Neurotics appear to be represented at neither extreme; in other words, their Picture Completion scores in general are relatively close to the Modified Mean. The Unclassified Schizophrenics tend more toward great drops relative to the Modified Mean; the Well-Adjusted Patrol tends toward superiority over the Modified Mean.

The fact that the Paranoid Schizophrenics and the Depressives show some tendency toward superior performance in Picture Completion in comparison to other subtests, while at the same time showing a significant drop on Picture Completion from the Vocabulary level, is merely a reflection of the findings presented in the sec-

Depressive Psychotics, Deteriorated Unclassified Schizophrenics, Acute and Chronic Schizophrenics together with the Obsessive-Compulsives, the remaining Neurotic groups and Depressive Neurotics, the Depressive Patrol, and the Non-Depressive Patrol. This hierarchical differentiation is the clearest yet obtained, and indicates the diagnostic importance to be attached to achievement on Picture Completion.

TABLE 47-A.—Modified Mean Scatter of Picture Completion.
Percentage of Cases in Ranges of Scatter

Group	No. of Cases	Percentages		
		$\leqq -2$	$<+2$ to >-2	$>+2$
(P + U) Sch (A + Ch)	51	24	64	12
U Sch D	7	57	43	—
(DP + DI)	15	33	47	20
(DSN + DN)	16	12	75	12
Neurotics	59	32	51	17
Patrol	54	17	57	26

TABLE 47-B.—*Differential Significance of Distribution of Cases*

Groups Compared	Chi^2(d.f. = 2)	Significance
(P + U) Sch (A + Ch) : U Sch D	3.86	10–20%
(P + U) Sch (A + Ch) : (DP + DI)	1.66	30–50%
(P + U) Sch (A + Ch) : Neurotics	2.16	30–50%
(P + U) Sch (A + Ch) : Patrol	3.59	10–20%
U Sch D : (DP + DI)	2.14	30–50%
U Sch D : Neurotics	2.51	20–30%
U Sch D : Patrol	8.04	1–2%
(DP + DI) : (DSN + DN)	2.77	20–30%
(DP + DI) : Neurotics (not tested, too close)		
(DP + DI) : Patrol	2.12	30–50%
Neurotics : Patrol	4.02	10–20%

7. *Modified Mean Scatter: Chi^2 Test.*

We turn now to the frequency distribution of the cases in each group into ranges of scatter, measured from the Modified Mean of the Performance subtests in Table 47.

The Table shows that the Deteriorated Unclassified Schizophrenics exceed all other groups in their tendency to be *especially* impaired on Picture Completion as compared with the other Performance subtests.

However, since in the Paranoid Schizophrenics, in most of the Depressives, in most of the Neurotics, and in the Patrol, the extreme positive and the extreme negative scatter counter-balance each other, the significance of differences in distribution, as presented in Table 47-B, is inconclusive. In other words, the distribution of scatter from the Modified Performance Mean in terms of percentages of cases falling into ranges of scatter becomes overlapping. Let us therefore turn to the *extremes* of positive and negative scatter as tabulated in Table 48. This Table presents the number of cases in each group having what we arbitrarily designated as extreme scatter in either direction from the Modified Mean. As the limit for the extreme scatter above, we took 2.5; as the limit for extreme scatter below, we took 3.75 weighted score units. The column presenting scatter *below* the Modified Mean shows that the greatest incidence of such cases occurs in the Schizophrenic groups; they are much rarer in the Depressives, the Neurotics, and the Patrol. 14% of the two main Schizophrenic groups, 22% of the Simple Schizophrenics, only 6% of the Depressives, only 3% of the Neurotics, and only 4% of the Normals have such specific drops in Picture Completion.

TABLE 48.—*Frequency of Extreme Modified Mean Scatter on Picture Completion*

Group	≧ +2.50	< −3.75	Group	≧ + 2.50	< −3.75
U Sch A	1	2	DP	—	1
U Sch Ch	1	2	DI	2	—
U Sch D	—	2	DSN	2	—
			DN	—	1
P Sch A	3	2			
P Sch Ch	—	1	Hy	1	1
P Sch D	3	—	A & D	1	—
			MN	—	—
P Co	—	1	O-C	—	1
S S	—	2	Neuras	—	—
Pr C	2	1	P (1)	8	1
Pr O-I	—	—	P (2)	2	1
			P (3)	—	—

The differentiation between the Schizophrenics and the other groups is less clear in regard to scatter *above* the Modified Mean. The tendency of Acute and Deteriorated Paranoid Schizophrenics to have well retained Picture Completion scores, in contrast to other Performance subtest scores, comes to expression here. However, the Patrol also has a significant number of such cases, and so do two of the Depressive groups. The Neurotics appear to be represented at neither extreme; in other words, their Picture Completion scores in general are relatively close to the Modified Mean. The Unclassified Schizophrenics tend more toward great drops relative to the Modified Mean; the Well-Adjusted Patrol tends toward superiority over the Modified Mean.

The fact that the Paranoid Schizophrenics and the Depressives show some tendency toward superior performance in Picture Completion in comparison to other subtests, while at the same time showing a significant drop on Picture Completion from the Vocabulary level, is merely a reflection of the findings presented in the section on Major Scatter Patterns; there it was pointed out that the Depressives, and to a lesser extent the Paranoid Schizophrenics, tend to have a more or less significant drop of the entire Performance level. In other words, Picture Completion is impaired in these groups but not more so than any other Performance subtest. The greatest significance of the Picture Completion drop in the Unclassified Schizophrenics is a reflection of the fact that some of their Performance subtest scores are well retained, and hence the drop below the Modified Mean may be significant.

We conclude that (a) Picture Completion scores well below the Vocabulary level and also below the Modified Mean occur most frequently in Unclassified Schizophrenics, this being especially true for the Deteriorated cases. (b) Although in the Depressives and in the Paranoid Schizophrenics there is a significant drop below the Vocabulary level, this is only one segment of the general trend for a lowering of all the Performance scores. (c) In the Neurotics and Normals the drop of the Picture Completion score, though consistent, is generally not large, and is a reflection of the finding that even in the Well-Adjusted Normals the Performance level is somewhat, though not significantly, lower than the Vocabulary level.

8. Analysis of the Extreme Weighted Scores of the Picture Completion Subtest.

Finally, we present evidence from the distribution of high and low weighted scores, to further substantiate and clarify the conclusions thus far drawn. Special Figure 2 represents the extremely low weighted scores less than 6, and shows that there are 18 such cases in our entire population. There are no Normals and no Neurotics among these. There are 7—or 47%—of the Depressive Psychotics; there are 8—or 22%—of the Unclassified Schizophrenics; of these Unclassified Schizophrenics, there are 4—or 67%—of the Deteriorated group. Paranoid Schizophrenics have only a small share, and Preschizophrenics have none, of these low weighted scores.

Special Figure 3 shows that only 5 cases in our entire population have high weighted scores[95] of 15; 3 of these 5 cases are from the Patrol, 2 of them are Preschizophrenics. Thus, of all subtests Picture Completion has the lowest share of high weighted scores, due partly to its vulnerability and partly to the limited weighted score range.

Table 49-A gives the percentage distribution of cases into three weighted score ranges, and Table 49-B gives the differential significance of these distributions. The tests of significance again show the hierarchy of impairment previously described for Picture Completion. That is, the Deteriorated Unclassified Schizophrenics and the Depressive Psychotics show the most impairment, and are followed in order by the Acute and Chronic Schizophrenics and the Depressive Neurotics, the Neurotics, and finally the Patrol. It is striking that there are no cases in the entire Patrol with a weighted score of 7 or less. None of the other major clinical groups shows such a good distribution. It is also striking that the Patrol has 22% of its cases with scores of 14 or 15, which far exceeds any other group. The breakdown of the Patrol into Depressive, Anxious, and Schizoid individuals shows no differentiation of any im-

---

[95] It has been discussed in the section on administration that the highest possible weighted score on Picture Completion is 15.

TABLE 49-A.—*Distribution of Weighted Scores on Picture Completion*

Group	No. of Cases	Percentages		
		0–7	8–13	14–15
(P + U) Sch (A + Ch)	51	31	57	12
U Sch D	7	71	29	—
P Sch D	5	20	80	—
DP + DI	15	80	20	—
DSN + DN	16	19	75	6
Neurotics	59	14	78	8
Patrol	54	—	78	22
Patrol Depr	16	—	88	12
Patrol Non-Depr	38	—	74	26
Patrol Anx	36	—	81	19
Patrol Non-Anx	18	—	72	28
Patrol Sch	12	—	75	25
Patrol Non-Sch	42	—	79	21

TABLE 49-B.—*Differential Significance of Distribution of Cases*

Groups Compared	Chi^2(d.f. = 2)	Significance
(P + U) Sch (A + Ch) : U Sch D	4.52	10–20%
(P + U) Sch (A + Ch) : P Sch D	.23	90%
(P + U) Sch (A + Ch) : (DP + DI)	11.46	<1%
(P + U) Sch (A + Ch) : Neurotics	6.13	2–5%
(P + U) Sch (A + Ch) : Patrol	20.15	<<<1%
U Sch D : Neurotics	13.04	<<1%
U Sch D : Patrol	40.28	<<<<1%
(DP + DI) : (DSN + DN)	11.83	<1%
(DP + DI) : Neurotics	26.43	<<<1%
(DP + DI) : Patrol	52.73	<<<<1%
Neurotics : Patrol	10.83	<1%

portance; perhaps the most significant of these breakdowns is that with respect to depressive trends, where the Non-Depressive Patrol has 26% of its cases with high weighted scores and the Depressive Patrol has only 12%.

We conclude that the hierarchy described appears to be a significant diagnostic finding, inasmuch as it is substantiated by all the scatter measures applied here.

9. General Diagnostic Conclusions.

(a) There is a rather clear hierarchy of groups in respect to failures on the easy as well as on the difficult items of Picture Completion, although the failures on the easy items are more diagnostically significant. The hierarchy is as follows: Deteriorated Unclassified Schizophrenics and Depressive Psychotics have the greatest percentage of failures, as well as the greatest percentage of *cases* failing several of these items; the Acute and Chronic Schizophrenics have somewhat fewer failures and cases failing; the Neurotics and the Depressive Neurotics do relatively well in this respect; the Patrol does very well, having an equally and extremely low percentage of failures and cases failing. The sharp differentiation between the Patrol and all the clinical groups demonstrates the diagnostic implication of severe maladjustment when there is impaired efficiency on this subtest.

(b) The relation of the Picture Completion score to both the Vocabulary and Modified Mean levels is of importance in differentiating Schizophrenics from Depressives. Both groups tend to have scores significantly below the Vocabulary level, reflecting their impairment of visual concentration: but for the Depressives this impairment is merely one segment of a general impairment of all the Performance subtests, and the scatter from the Performance Mean (full or modified) is insignificant; while for the Schizophrenics there appears to be a tendency for other Performance subtests to be better retained than Picture Completion, and hence the scatter below the Performance Mean remains generally significant. In other words, Schizophrenics tend more than any other group to suffer especial impairment on this subtest.

(c) The Preschizophrenics and Paranoid Conditions—the "intellectualizing" groups—show some impairment on Picture Completion in comparison to their well-retained Vocabulary and Verbal subtest scores.

(d) The Obsessive-Compulsives and the Hysterics both show impairment on Picture Completion; for the Obsessive-Compulsives this is but another indication of their tendency to have a scatter pattern similar to the Schizophrenics, while for the Hysterics the impairment appears to be specifically isolated and may be considered characteristic for them.

(e) In the Normal group, Picture Completion tends to be only slightly below the Vocabulary level, and equal or superior to the Performance Mean.

(f) Extremely low weighted scores should be expected only in Schizophrenics or Depressive Psychotics; extremely high weighted scores occur most often in Normals, and low weighted scores (of 7 or less) do not occur at all in them. Cultural factors appear to play no significant rôle in this subtest; rather, a normal adjustment and no impairment of concentration are the important factors in efficient achievement.

N. VISUAL-MOTOR COORDINATION

In the sections to follow we shall deal with the remaining three Performance subtests of the Bellevue Scale: Object Assembly, Block Design, and Digit Symbol. These tests must be segregated because they differ from the two other Performance subtests, Picture Arrangement and Picture Completion, as well as from all the Verbal subtests. They will be referred to as tests of visual-motor coordination.[96a] This was the common psychological denominator by which these three tests could be referred to, although visual-motor coordination, visual organization, and speed of motor action play such varied rôles in these three subtests that it is somewhat arbitrary to refer to them under one heading. Nevertheless, they all involve essential motor activity guided by visual organization; that is, they imply visual direction in their execution.

Visual-motor coordination is a term implying that our motor actions are not executions of mental decisions which precede them in time; but rather are initiated by a general decision, which in the course of the motor action is modified step by step to meet the specific situation partly encountered by and partly created by the motor action in progress, as this situation is revealed to us by the visual function—and in more complex situations by other functions too.

In everyday life, for reasons to be discussed below, this visual-motor interaction rarely becomes easily perceptible. But in learning new functions implying motor action, or handling delicate or dangerous objects, we become keenly conscious of this interaction. The impairment of this coordination may remain veiled by habituated movements; but the results of it are seen in the avoidance of new activities requiring such coordination. Visual-motor coordination, though hardly noticed in everyday life, is a very sensitive indicator of maladjustment.

[96a] In order to underscore the great importance we attach to the rôle of visual-otor coordination in the performance of psychiatric patients in these tests, we wish o quote here the more usually accepted view. In our treatment of the Block Design test we have made a point similar to the one to be quoted. The relationship of the more customary view to the one crystallized out of our clinical experience is not as yet clear to us. The following quotation is given here to indicate to the reader the need for further theoretical clarification: "In your characterization of this group as involving 'visual motor coordination' I have the feeling that you have avoided getting to grips with the essential character of the material and have compromised on a rather superficial description. The visual part is to a considerable extent irrelevant, isn't it? Wouldn't the same general principles presumably be true if you were dealing with material in the auditory sphere? And is the coordination being tested particularly here? Except in extreme instances it appears to me that it probably plays little rôle especially in the items excepting the Digit Symbol. The important things after all would seem to be the analytic and synthetic processes involved in achieving relevant assembly. In giving it the name which you have, haven't you led yourself astray somewhat and haven't you drawn the reader's attention away from the more essential aspects? To some extent what I say here also holds for the 'visual organization' items." (Quoted from a letter of David Shakow.)

Only since Goldstein's studies has interest in visual-motor coordination been revived in modern psychopathology. The investigations concerning drawing and sculpturing in comparative developmental psychology[96b] scarcely pay attention to analysis of integration of visual and motor functions in the creative activities of children, primitives, and brain-injured and psychiatric cases. Interest in visual-motor coordination came most to expression in the work of Schilder and Loretta Bender, both of whom put to use in their investigations the experimental methods of Wertheimer and Lewin. The present authors do not feel in a position to evaluate either the clinical or the theoretical significance of the investigations that culminated in Bender's "Visual Motor Gestalt Test". It appears certain, however, that this work more than any other brought to the fore in psychology the problem of visual-motor coordination.

This problem remains veiled to psychologists as a consequence mainly of two circumstances. First, a great sector of the motor-executive actions of humans is very much habituated and thus stereotyped. Just as in tests like Comprehension, where verbal convention veils and replaces judgment, so in motor action the delicate interplay of visual and motor functions is disguised and made imperceptible by its habituated, automatic character. Secondly, many of our actions occur in a situation so simple that its visual organization presents no problem. In other words, the spatial situation is such that it lends itself easily to visual organization, and as a result it appears that we have consciously decided, before the motor action occurs, the course the motor action should take. As a consequence, visual organization and motor action do not appear to interact, and motor action seems to be only a servile executor of the directives of visual organization.

But the "space" of visual organization and the "space" of motor actions are not two psychologically independent spaces. We create the space in which we live by a delicate interaction of many factors, of which visual organization and motor action are probably the most predominant; and the interaction of these is one of our most finely-tuned functions. It is possible that one of the reasons for the inclination of Performance subtests to be more vulnerable than Verbal subtests is the delicacy of this interaction, which is so easily disturbed by maladjustment.

We are still far from the time when knowledge of the rules governing visual-motor coordination will be sufficient to serve us as the basis for judging achievements on tests. The effort to offer at least some tentative framework or vantage point from which the performance of the following three subtests can be judged appears to justify the present authors in putting forth here some considerations concerning visual-motor coordination.

[96b] See H. Werner (31).

Some initial evidence for the belonging together of these three subtests can be derived from Special Table 3. This Table shows that the average scores of our total population on these subtests and their standard deviations both cluster closely together, occupying a middle position between the relatively sturdy Verbal and extremely vulnerable Digit Span, Picture Arrangement and Picture Completion subtests.

Of these three subtests, Object Assembly appears to be the most vulnerable, as indicated by the lowest average score and the highest standard deviation. These quantitative differences however are very small, and they are mentioned only because clinical experience definitely attests to the great vulnerability of Object Assembly; the reasons for this vulnerability will be discussed in the Object Assembly section.

The rôle of visual organization in each of these three subtests is different. In Digit Symbol, its rôle consists mainly of the same guiding action which visual organization plays in every kind of writing or drawing; the extent of this will be appreciated by anyone who has attempted to have a variety of subjects draw familiar patterns or write more than a few words blindfolded. Closer consideration, however, shows that the symbols to be copied in this subtest are not quite as well habituated as those of handwriting. Furthermore, it will be noticed that in Digit Symbol visual organization has the additional rôle of being the channel of *learning* of the proper symbols, as well as of their correct reproduction.

The rôle of visual organization is quite different in Object Assembly. Here jig-saw parts must be put together into a form familiar in everyday life. The essential motor action consists here of juxtaposing the different parts so that a visual process of "clicking together" of the parts into a meaningful pattern may occur. If the pieces are shifted too quickly, there is no time for such a process to occur. If it is done too slowly, the subject either gives himself no chance to try the possibilities of different combinations, or the slowness, accompanied by doubt or lack of interest, prevents the "clicking together" experience. Each subject appears to have an optimum speed at which this experience can come about; and once having lost this speed, solution is achieved with difficulty or not at all.

One who administers Object Assembly often enough will see cases in which it becomes clear that the random moving of the parts suddenly brings one part into a relation to another, by which a familiar configuration is brought to the subject's mind and reveals to him the meaning of the entire mix-up of parts. At such times the subject behaves as though in that moment the pieces were magnetic and pull each other together.

In the Block Design subtest the material is quite different, and the visual organization pertains to geometrical patterns. The pattern is given on the sample card, and must be broken down and built up again out of block faces. The work of visual organization here seems to be first analytic and then progressively synthetic, but in reality these two interlace. On the one hand, the Block Design patterns are much less familiar to the subject than the patterns of Object Assembly; on the other hand, the subject is guided here by a pattern, kept before him as he works, of straight lines that obey definite recognizable rules, and can be followed logically to a completion of the task. Yet it would be an error to consider the whole performance a matter of logic. This is clearly shown in the fact that individuals superior in logical reasoning may fail badly on Block Design.

Thus far we have not discussed the rôle of motor action in these subtests, which may have given the impression that we consider motor action to be of secondary significance. That motor action is of primary significance in the Digit Symbol subtest is commonplace knowledge to anyone who ever tested a case in which brain injury has impaired motor action. Such a subject may well see, and may well verbalize, the symbol he wants to write, and nevertheless the hand may not obey. Similarly, the occurrence of cases in which motor-habituated forms, similar to one of the sample symbols given to the subject, distort the reproduction of that symbol, shows one aspect of the rôle of motor action in this test. This is a test of speed of both writing and ocular shifts, though the learning process may cloud the motor action. In this subtest individual examiners may be tempted to think less about the rôle of visual organization and more about that of motor action and its speed. In earlier paragraphs we have attempted to show that this is detrimental to the proper understanding of the achievement.

Escalona, in her "level of aspiration" studies on Depressives (7), has adduced some evidence that their motor retardation may be of two types: either a retardation of *decision*, or an essentially motor retardation. In the former, it takes a long time for a decision to come about, but as soon as the decision is made the action is carried out; in the latter, the execution as well as the decision takes a long time. The examiner will find these same conditions present in the Digit Symbol achievement of slow cases. Hesitation, and the necessity of studying and relearning again and again the symbols, show the disharmony of visual and motor organization in these cases. Such an initial retardation may be followed either by a quick and correct writing of the symbol, or by a slow, hesitant, poorly-shaped writing of it. On the other hand, the retardation may consist in slow laborious writing, without loss of time from excessive hesitation or the need to make special decisions about the symbol.

The rôle of the motor factor is quite different in Block Design and Object

Assembly. From the initial description of these subtests, it may seem that motor activity is subordinated to visual organization. It is quite probable that visual organization plays a primary rôle, but the essential rôle of motor action should not be forgotten, especially when we except the "mannikin" from Object Assembly and the first two items from the Block Design, and when it is clear that the subject has difficulty in immediately deciding what the Object Assembly tasks should result in, or exactly how one should go about building the required type of pattern with the blocks. The blocks or the jig-saw parts must be brought near to each other, and then put distant from each other, in order to allow for proper combinations, on the basis of which visual organization can make clear the "meaning" of what is to be constructed and how it can be constructed.

It is difficult to put into words what every experienced examiner notices about the character of this motor action. In some very keen individuals it can be replaced by acute reasoning and unusually alert spatial organization. These individuals decide promptly what is to be put together and how, and the motor action becomes merely one of placing the parts. In the majority of the cases, the motor action remains more important. Sometimes in the last three or four seconds, the examiner is expecting the subject to put the last block into place, and it may even already be in place; yet the subject, not giving himself time for the visual "clicking together" to occur, will remove the block from its place, and may even remove several other blocks with it, thereby failing the item.

Acute tension, anxiety, and hyperactivity are some of the factors whose impact on motor action prevents whatever visual organization would bring about. On the other hand, Schizophrenic chronicity and deterioration may result in visual disorganization preventing the breakdown of visual patterns into parts.

O. OBJECT ASSEMBLY

1. Introduction. The Object Assembly subtest is one of the three Performance subtests segregated as tests of visual-motor coordination. Clinical experience, as well as the score averages and standard deviations for our total population shown in Special Table 3, indicate that it is the most vulnerable of the three.

Object Assembly consists of three items, each of which is a simple jig-saw problem: a mannikin, a profile, and a hand. The mannikin consists of 6 pieces, the others of 7 pieces each. If all the pieces are correctly placed, a raw score of 6 is credited. One raw score unit is deducted for each misplaced or unplaced part.

The time allowances are generous, being two minutes on the first item and three minutes on the other items. If 5 or 6 raw score units are achieved on the last two items in less than 64 seconds, time credits are given, ranging from one to four raw score units. The sum of the raw scores on the three items plus the time credits is translated into a weighted score.

Clinical experience shows that the vulnerability of this subtest is in considerable part due to the fact that, on the one hand, the highest weighted score obtainable without time-credits is 10, and on the other, no time-scores are given on an item if a raw score below 5 is obtained. Thus, a reversed ear in the "profile" item, or an exchanged position of two fingers on the "hand"—which in themselves may be "temporary inefficiencies"—will not only decrease the raw score of the subject by two units, but will also eliminate the possibility of acquiring time credits. The significance of this point for the administration and the theoretical background of the subtest will be discussed in the appropriate sections.

2. Visual-Motor Coordination in the Object Assembly Subtest. The three items of Object Assembly are (a) a mannikin to be put together out of the trunk of a body, four limb-parts, and a head-part; (b) a profile of a human head to be put together out of a skull-part, on which hair and half an eye and eyebrow are painted, two ear-parts, an occipital skull-part, on which hair is painted, a half-eye-part, a nose-part, and a lip-and-chin-part; (c) a hand to be put together out of a palm-part, four finger-parts, and a thumb-part with an adjoining palm area.

The mannikin has many painted markings on the limbs, body, and head which make it relatively easy to identify the parts, especially since they are cut up in conformity with the natural articulation of the human body. The situation is different for the profile. On the mannikin, the natural articulation and the painted lines both serve as clues; on the profile, the six parts to be fitted to the large skull-part do not follow the articulation of the human head, and thus the painted lines of features become of crucial significance as clues. The hand is even more difficult: it has no markings, and though the finger-parts are separated roughly in conformity with the natural articulation of the hand, the thumb-part and its adjoining palm-area are not so well articulated, and—what is more important—the palm character of the main part can hardly be discovered on first sight.

Since there are only three items, a quantitative item-analysis seems hardly expedient. The qualitative features of this subtest proved refractory to statistical treatment. The notes we made of the performance of different subjects proved unsuited for a rigorous tabulation and evaluation. We hope that it will be feasible to offer at some future time a quantitative analysis of these qualitative features; at present we can resort only to a description of them.

Before we enter the discussion of these qualitative features, which are intimately linked up with the function of visual-motor coordination, the concept of visual organization is in need of discussion, because it will be referred to repeatedly.

The most common rôle of visual organization lies in the perception of objects, where it plays the rôle of identifying—supplying us with the "meaning" of—the objects. We are so accustomed to it in this rôle that we do not even notice it. However, when objects are seen under conditions adverse to "perception as usual"—such as when partly covered, or moving with great speed, or in dim light, or at an unusual angle or distance—the rôle of visual organization becomes clear. In misrecognitions and in individual differences in apperception of the "meaning" of the object and its properties, it becomes clear that visual percepts are not passive copies of the world but rather are actively structured by a visual-organizing process. That the visual organization process is determined in final analysis by the affective organization of the subject, as in the case of memory organization, will become clear in the discussion of the Rorschach and Thematic Apperception Tests. Here, however, we are concerned with the structural rather than with the affective aspect of visual organization.

Another everyday form in which we encounter visual organization is in visual memory as expressed in imagery. Any person who has attempted to get subjects to describe their visual memory of an object or person they are very familiar with, knows that the visual memories in question vary from extreme vagueness to crystal-clear detail. It goes without saying that characterization of persons as "good observers" and "visual types" refers to sharpness of visual organization.

Visual organization as a dynamic entity becomes clear when we see a part of something usually seen as a whole. Thus, in the Incomplete Pictures subtest of the Minnesota Preschool Scale, one series of pictures presents on its first card one line of a shoe, on the second card more lines of the shoe, and so forth, until the last card represents the total shoe. The aim is to learn how much must be presented before the visual organization of "shoe" comes about. The individual variations are very great. A sharply accurate and differentiated visual organization will deliver correct images on few clues; while a vague, indefinite visual organization will need many clues. A rigid visual organization will stick to a once conceived interpretation of a clue without allowing for change; a flexible visual organization will quickly integrate new clues and adapt itself to them by restructuring the visual image.

In this connection one could talk about "concept formation" present in visual organization, about "visual anticipation", about the rôle "attention" and "concentration" appear to play here, about the relationship of visual organization to the concept of "closure" (Prägnanz) of Gestalt

Psychology—but at the present stage of our knowledge such discussions would lead us too far into speculation. It will be seen below that visual organization plays a very considerable rôle in Object Assembly achievement—in fact, much more so than in Block Design and Digit Symbol, because in the latter subtests samples are put before the subject, while in Object Assembly he must rely more on visual organization unguided by samples.

To clarify the rôle of visual-motor coordination in Object Assembly, let us examine the performance on the mannikin item. On the basis of our experience the course of a normal, successful and speedy performance can be described as follows. Inspecting the pieces put before him, the subject sees one which identifies for him the item; he states to himself, and frequently even aloud, "It is a man." Most frequently it is the head part from which this recognition emanates. Subjects of the keenest visual organization (observation) are by this time clearly aware that there are arms and legs before them, and have also noticed the difference between those limbs which have a curved and those which have a cornered joint. For these cases the rest of the performance—that is, the motor activity—is purely executive; its rôle is merely to move the parts into the places clearly defined by the specific and correct visual organization. Other subjects, when they recognize that the object is a man, may not apprehend at all the significance of the shape of joints and other features of the limbs. Some subjects of this type will leave the rest of the performance to a trial-and-error motor activity; they will try the round-ended arm into the angular arm base, and only then will place it correctly. Some subjects even among the adult population will try the legs in the arm sockets; this is most frequent in psychotics. Some subjects will not learn by trial, probably because their visual guiding image is very vague; they will leave the round-ended arm in the angular arm base and vice versa, or even the legs in the place of the arms. Other subjects resort to trial motor activity, but have sufficiently clear visual-motor coordination that while moving the parts, and before actually trying the rounded arm in the angular arm base, they recognize the situation; thus without having lost time in this trial, they will shift the piece into its right place.

We see here a continuum of those visual organizations which are sharp and fully-anticipating; those which come into full play only after some trial motor activity; those which are mobilized only after considerable trying and erring; those which are so vague that only the general idea of dealing with a human figure is crystallized, and it makes no difference to them whether the arms are in the proper joints or even in the place of the legs; and finally, those where no visual organization is initiated, and no recognition of what they are dealing with comes about. We also see that the less crystallized and keen the visual organization is, the more important is the rôle given to trial motor activity. The extreme end of this continuum of increasing significance of trial motor activity is seen in those psychotic cases—mainly deteriorated ones—where by trial-and-error all the pieces are fitted into their right place, and only then, if at all, do these cases recognize it is a man's figure. The principle underlying such performance will be called "pattern coherence", and will be further discussed in connection with the statistical considerations.[97a]

Here we shall devote only a short discussion to it. "Pattern coherence" is a term describing a regulative principle of motor performance other than the one referred to as visual organization. When visual organization is impaired, and no visual anticipating image is formed, motor trial-and-error attempts are usually made. These trials and errors are characterized by "fitting" of edges and finding "continuations" of lines; that is, by *concrete*, piece-meal, partial characteristics rather than by over-all guiding organization, image, meaning, or plan. One could argue that this is still visual organization in a primitivized or fragmentized form. This would be correct insofar as the "fitting" and "continuation" of pieces, once achieved or failed, is approved or disapproved by visual organization; and when a figure is completed, visual organization may lead to its recognition. But the significance of the motor "feel" that "it fits" should not be underestimated, and the fact that even finished figures may be left unrecognized is also an aspect of performance by "pattern coherence".

Motor *speed* does not play a great rôle in completing these items, because the time allowance of two minutes is ample to finish the mannikin even by trial-and-error. Motor speed does play a rôle when motor action in moving the parts is too fast or too slow, and prevents the subject from restructuring his visual organization.

In visual-motor coordination, the motor action is, on one hand, guided by the existing visual organization, and on the other, gives clues and opportunities for restructuring of visual organization by bringing pieces into relationships conducive to "closure"—recognition of a familiar pattern.

[97a] Dr. Martin Scheerer calls our attention to the fact that Goldstein and he described this state of affairs, using the same term as we have proposed here. We are glad to give them here full credit of priority by quoting Dr. Scheerer's letter: "I think there are certain correspondences between your findings and ours, and I wonder whether you perhaps could point out these similarities in your publication. When you read Goldstein's and my monograph, you will find that we speak of a 'matching' in fitting angles or line-continuation instead of grouping in terms of the meaning of the object parts or objects. (11, pp. 32, 33) Correspondingly, we found on the Kohs a very similar procedure which you describe as: 'the subject is guided in his placement of each block by the perceptual agreement of his construction with the sample design. In some cases upon completion of the design the agreement might really click. . .for both the object assembly and the block design subtests we have used the term "pattern coherence".' We have described the same approach and procedure and speak of concrete matching of patterns without abstract conception of the design construction." (11, pp. 113–115)

Motor inefficiency itself, besides making for low motor speed of performance, may result in careless and not-quite-fitting placement of the parts into their right places; this is considered a temporary inefficiency, and is penalized by subtracting one raw score unit from the total raw score.

Similar considerations hold true for the rôle of visual-motor coordination in the second item, the profile. The difference between the mannikin and the profile is that with the latter most subjects obtain in the beginning a vaguer visual organization of what they are dealing with, and even many normal subjects will not at first realize at all the object they are piecing together. The painted hair-lines and eye-lines, continuing from one fragment to another, are of influence here. This influence can be of two kinds. On the one hand, the painted lines may lead to "visual organization"; on the other, where "pattern coherence" is the guide, the lines may prompt only a search for "continuation", and may lead to total confusion by joining pieces which are altogether unrelated. Taking these facts into consideration, it is obvious that on the profile item we shall see fewer performances where visual organization directs the motor action in the assembling of the pieces, and more performances where visual-motor coordination—a tuning-together of motor speed and consequent restructuring of visual organization—will be the basis of the performance. Experience shows that the less familiar and the less clearly structured the task, the more the test becomes one not of visual organization with subsequent motor execution, but of visual-motor coordination. Still, on this item we do encounter performances based on immediate and correct visual organization.

The sawed-in-two rectangle of the ear is frequently placed in upside down. In doing so, the subject displays a weakness ("carelessness") of visual organization, and sometimes even an absence of it. In the latter case, the subjects go merely by "pattern coherence" in fitting together the two parts of the rectangle and in placing them in the rectangular hole in the skull; and upon questioning, it may be found that they do not realize that it is an ear. In many subjects, however, it is a temporary inefficiency which causes the reversal of the ear and the consequent loss of two raw score units with the additional loss of possible time credits. Here again it is obvious that the test is not one of motor speed, and that as far as motor function plays an essential rôle, it is by virtue of the necessary visual-motor coordination.

The considerations for the third item, the hand, are again similar, though "pattern coherence" may play a much greater rôle in its performance than in the first two items. The reason is that there are no markings, and only a partially anatomical-natural division of the parts to be pieced together. That "pattern coherence" often takes the place of visual organization in this item is seen by the fact that the fingers are frequently placed upside down into the inter-finger spaces on the palm, and that the thumb is often fitted in correctly only by virtue of the angle at which it meets the palm part, without recognition by the subject that it is a palm and a thumb. The interchange of the fingers is also a sign of weakness of visual organization, though usually a "temporary inefficiency."

On both the profile and the hand items, a placing of the pieces around the periphery of the main part is frequently seen. This is characteristic of visual disorganization, and is frequently seen in cases characterized by paramount anxiety and in clear-cut psychotic cases.

Thus, visual-motor coordination is the underlying process of Object Assembly; it consists of a visual guidance of motor action which in turn, if of proper speed, gives opportunity for restructuring the initial visual organization. Abortive forms of this coordination occur when the visual organization is fully crystallized at the beginning, and the motor action appears to play the rôle of the executing servant; or when visual organization is extremely weak or absent, and trial motor activity and "pattern coherence" appear to determine the performance.

3. Administration. Several points of administration of Object Assembly not touched upon by Wechsler should be taken up here.

(a) Low weighted scores may be due to "temporary inefficiency", as manifested by reversing the ear or interchanging two fingers, each resulting in the loss of two raw score units and possible time credits. Thus the examiner should establish whether losses are due to "temporary inefficiency"; if this is the case, in evaluating the scatter of the subtest he should refrain from inferring the presence of profound impairment.

(b) Since assessing "temporary inefficiency" may be of crucial significance for the evaluation of the scatter, it is necessary that the examiner record the subject's procedure in working on the items of the subtest, and inquire into and record the patient's subjective experience of his performance. It is particularly important to find out whether, when, and how the subject discovered what object he was piecing together. Needless to say, the rationale of queer constructions particularly must be inquired into.

(c) As in the other subtests, here also it is necessary to ask the subject to indicate when he is finished, so that he gets no clue of approval or disapproval from the examiner. It is also important to test whether an erroneous solution can be corrected, or a slow performance completed; furthermore with how much help, if any, the patient can reach a solution.

4. Vocabulary Scatter and Mean Scatter: "t"-Test.

The average Vocabulary Scatter of Object Assembly for all the clinical and control groups is represented in Graph 5 of Special Figure 1. The two most significant trends indicated on this graph are: (a) all the Depressives, and the related Neurasthenic and Anxiety and Depression groups, have great drops of Object Assembly scores below their Vocabulary level; (b) in both the Unclassified and Paranoid Schizophrenics there is a trend for impairment to be greatest in the Acute, less in the Chronic, and least in the Deteriorated cases.

The trend regarding the Depressives offers support for the qualitative conclusions drawn previously: namely, that depressive retardation of motor speed and/or decision-time results in poor achievement, since it reduces the possibility of getting extra time credit and even the possibility of completing the tasks within the time-limits.

The trend found in Schizophrenics also offers support for the qualitative conclusions drawn previously: namely, that random motor activity, free from emotional turmoil of the impulse-ridden or anxious type, may improve the patient's achievement. This is not to say that the solution is reached in the manner characteristic of normals; rather, close observation of the Deteriorated and Chronic Schizophrenics' performance shows that in many of them co-ordination between motor activity and visual organization is absent, as is any basic understanding of the achievement. In other words, the blandness of the Deteriorated and some of the Chronic cases results in good achievements on this test because the restlessness or bizarre impulsiveness of some of the anxious Acute cases is no longer present, and the hurried planless trial-and-error performance and preoccupation with small details of the jig-saw pieces no longer occur; the Deteriorated Schizophrenics tend to move the pieces around somewhat aimlessly and casually, and when one of the fragments is more or less accidentally held near its correct position, gross appreciation of the "fitting together" occurs with little understanding of why the piece belongs there or what it represents. Such understanding generally becomes conscious only near the end or sometimes after the end of a successful performance, or even not at all. Our groups are relatively small, and many reservations must be made concerning these observations and results. Nevertheless, they merit attention because they offer some evidence concerning the striking variations of visual-motor function in Schizophrenia, and may contribute to the understanding of the change in functioning which takes place in deterioration.

If we turn to Special Table 1, which presents the average Vocabulary Scatter of each group and its significance, we see that these trends concerning the Schizophrenics come to clear statistical expression. The most significant drop is present in the Acute Schizophrenics; there is only a trend to drop in the Chronic Schizophrenics; and there is no trend whatsoever for the Deteriorated Schizophrenics to be significantly below the Vocabulary level on Object Assembly. The consistency of this pattern in both the Paranoid and the Unclassified Schizophrenics, each considered separately, indicates that these results are not merely fortuitous.

The most significant drop below the Vocabulary level occurs in the Psychotic Depression group; and the other Depressive groups show nearly significant or significant tendencies to have great negative Vocabulary Scatter on Object Assembly. There are many other groups which show significant drops below the Vocabulary level; but the drops of the Depressives, the Anxiety and Depression group, and of the Acute Schizophrenics appear to be the greatest and most significant. The Neurasthenics also show an appreciable drop. This is a reflection of their general sluggishness and slowness, which results in an impairment on this subtest similar to that of the Depressives.

The Hysterics, surprisingly enough, show a significant drop, which should be considered a reflection of the disturbing effects of anxiety on efficiency. We have already mentioned the significant drop of the Anxiety and Depression group in connection with the Depressives; it is likely that the great anxiety in these cases, as well as their depressive trends, impairs their efficiency. The Hysterics and the Anxiety and Depression group are the most anxious of our Neurotics, and show the most significant impairment on Object Assembly; it appears thus that not only depression, but acute anxiety in a Neurotic or a Schizophrenic may make for impairment of efficiency on Object Assembly.

The drop of Object Assembly in the Patrol, though not very large, is also significant; but as we shall see later, this is due mainly to the impaired efficiency of the Schizoid Patrol, which is included in these totals.

We conclude that acute anxiety, depressive trends, and neurasthenic retardation impair efficiency on Object Assembly.

For a further cross-evaluation of these findings, let us turn now to Special Table 2, which gives the average scatter from the Performance Mean. In this Table, the Deteriorated Schizophrenics show up as doing exceedingly well on Object Assembly, relative to their Performance Mean; the Deteriorated Unclassified Schizophrenics show a positive scatter of 4.1 weighted score units, which is significant much below the 1% level; the Deteriorated Paranoid Schizophrenics show a trend toward a significant positive scatter. Consistent with these findings is the fact that the Simple Schizophrenics also show a trend toward positive scatter. The continuity of these results probably derives from the clinical fact that both the Deteriorated and the Simple Schizophrenics manifest a considerable degree of blandness, particularly lack of anxiety. Here again is support for the finding that, as regards visual-motor coordination, lack of anxiety may serve to increase efficiency even in the presence of visual disorganization.

We may describe the Schizophrenic's scatter pattern on Object Assembly thus: the Vocabulary in the Schizophrenics remains, in general, relatively well-retained; thus the Deteriorated cases, which have a relatively high Object Assembly score, do not differ significantly from their Vocabulary level, while the other Schizophrenic groups, which show impairment on Object Assembly, show a significant drop from the Vocabulary level. But the Performance Mean of the Schizophrenics is, in general, somewhat lowered; thus those Schizophrenic groups which had a negative Vocabulary

Scatter show no tendency to differ from the Performance Mean, while the Deteriorated groups and the Simple Schizophrenics show a striking tendency to be above the Performance Mean.[97b]

The Depressive groups do not differ significantly from their Performance Mean, although they showed a considerable drop from the Vocabulary level; this again indicates the presence of a uniform lowering of all the Performance subtest scores in the Depressive groups.

It is of interest to examine the scatter from the Performance Mean of the Hysterics and the Anxiety and Depression group, which had a significant drop below the Vocabulary level. We have mentioned that the drop in the Hysterics was due essentially to anxiety encroaching upon efficiency on this subtest, and it is therefore not surprising that they still show a significant, though small, scatter below the Performance Mean. This implies that other Performance subtests are generally well retained, and that the specific effects of anxiety come to clearest expression in the Object Assembly drop.[98] In regard to the Anxiety and Depression group, we have mentioned that two factors are at play in their impaired efficiency on this subtest—namely, the depressive trends, and the anxiety. We have already seen that depression tends to lower all the Performance subtest scores uniformly, and thus it is not surprising that the Anxiety and Depression groups' Object Assembly scatter below the Performance Mean is only a trend. The trend, however, is present and may be taken to indicate that anxiety combined with depression may make for special impairment of efficiency on Object Assembly.

We conclude *that* (a) the factors of anxiety and/or depression make for impairment on the Object Assembly subtest. (b) If depression is the essential factor, the Object Assembly score will be well below the Vocabulary level but not below the other Performance subtest scores which also suffer from the depressive trends. (c) If anxiety, especially neurotic anxiety, is the essential factor, the Object Assembly score will tend to be not only below the Vocabulary level but below the Performance Mean. (d) Psychotic blandness, as found in the Deteriorated and Simple Schizophrenics, may result in a relatively well-retained Object Assembly score which is not significantly different from the Vocabulary level and even tends to be very much above the Performance Mean. This well-retained Object

---

[97b] Not only the Performance Mean, but also the Vocabulary level of Deteriorated Schizophrenics tends to show some drop. Thus, we must assume that the trend here seen for Deteriorated Schizophrenics to have a small drop below Vocabulary and a rise above Performance Mean depends both on the non-impairment of Object Assembly by deterioration, and the impairment of the media of comparison (that is, Vocabulary level and Performance Mean). This explains why some of the low Object Assembly weighted scores do not vitiate the trend found.

[98] The only other Performance subtest on which the Hysterics tend to be impaired is Picture Completion.

Assembly score is a scatter feature which is of considerable significance for differentiating Deteriorated Schizophrenics from Depressive Psychotics. (e) The improvement on Object Assembly which accompanies chronicity and deterioration in Schizophrenia is a finding with important theoretical implications regarding the nature of disorganization of visual-motor coordination in the progressing psychotic process.

TABLE 50-A.—Vocabulary Scatter of Object Assembly. *Percentage of Cases in Ranges of Scatter*

Group	No. of Cases	Percentage of Cases		
		≧0	−1 to −4	<−4
(P + U) Sch A	28	21	43	36
(P + U) Sch Ch	23	48	30	22
U Sch D	7	57	43	—
P Sch D	5	40	40	20
DP + DI	15	20	20	60
DSN + DN	16	25	50	25
Neurotics	59	25	46	29
Patrol	54	43	39	19
Patrol Anx	36	42	36	22
Patrol Non Anx	18	44	44	11
Patrol Sch	12	17	33	50
Patrol Non Sch	42	50	40	10
Patrol Depr	16	31	38	31
Patrol Non Depr	38	47	39	13

5. *Vocabulary Scatter: Chi² Test.*

For further evaluation of the scatter of Object Assembly, let us turn to Table 50-A which presents the percentage distribution of cases of the various groups into ranges of Vocabulary Scatter. The percentages closely parallel the Object Assembly data represented in Special Figure 1. In addition to those findings, it shows that the Deteriorated Unclassified Schizophrenics have more cases with Object Assembly scores above the Vocabulary level than do the Deteriorated Paranoid Schizophrenics.

Table 50-B presents the differential significance of these distributions. The first three Chi² tests show that the difference between the Acute and Deteriorated Schizophrenics approaches significance, while comparison of either of these groups with the intermediate Chronic Schizophrenics is hardly significant. In other words, on Object Assembly the trend for increasing efficiency of performance which accompanies progressive deterioration, as tested in terms of *case distribution*, follows the same pattern as that demonstrated in terms of *average* Vocabulary Scatter, though to a milder degree. The next three Chi² comparisons show that with increasing deterioration the Schizophrenics become increasingly superior to the Depressive Psychotics, who have most of their cases well below the Vocabulary level. The comparison of the three Schizophrenic groups with the Neurotics shows that, with increasing schizophrenic deterioration, the Schizophrenics become increasingly superior to the Neurotics.

TABLE 50-B.—*Differential Significance of Distribution of Cases*

Groups Compared	Chi² (d.f. = 2)	Significance
(P + U) Sch A : (P + U) Sch Ch	4.01	10–20%
(P + U) Sch Ch : (P + U) Sch D	1.94	30–50%
(P + U) Sch A : U Sch D	5.00	5–10%
(P + U) Sch A : (DP + DI)	2.75	20–30%
(P + U) Sch Ch : (DP + DI)	5.89	5–10%
U Sch D : (DP + DI)	7.37	2–5%
(P + U) Sch A : Neurotics	.45	80%
(P + U) Sch Ch : Neurotics	3.85	10–20%
U Sch D : Neurotics	4.26	10–20%
(P + U) Sch A : Patrol	4.69	5–10%
(P + U) Sch Ch : Patrol	.50	70–80%
U Sch D : Patrol	1.54	30–50%
(DP + DI) : (DSN + DN)	4.27	10–20%
(DP + DI) : Neurotics	5.34	5–10%
(DP + DI) : Patrol	10.30	<1%
(DSN + DN) : Patrol	1.66	30–50%
Neurotics : Patrol	4.06	10–20%
Patrol Anx : Patrol Non Anx	.99	50–70%
Patrol Depr : Patrol Non Depr	2.59	20–30%
Patrol Sch : Patrol Non Sch	10.96	1%

A comparison of these three Schizophrenic groups with the Patrol, which is relatively unimpaired on Object Assembly, shows that with increasing deterioration the Schizophrenics show Vocabulary Scatter similar to the Normals.

The Depressive Psychotics show a trend to be worse than the Depressive Neurotics and the Neurotics, and are significantly worse than the Patrol. Even the Neurotics show a trend to be worse than the Patrol.

The breakdown of the Patrol is of special interest; it shows that it is the schizoid factor in Normals which is most likely to impair efficiency on Object Assembly. In Table 50-A we see that 50% of the Schizoid Normals have an extreme drop on Object Assembly below the Vocabulary level, while this occurs in only 10% of the Non-

Schizoid Normals; this difference in distribution is significant on the 1% level. The Patrol as a whole shows a superior efficiency to any of the clinical groups.

We conclude that (a) Depressive Psychotics have the greatest percentage of cases with Object Assembly extremely impaired below the Vocabulary level; (b) with increasing Schizophrenic deterioration, the Object Assembly efficiency increases significantly; (c) the Schizoid Normals drop as badly on Object Assembly as the Acute Schizophrenics; (d) Non-Schizoid Normals in general do quite well on this subtest.

6. *Modified Mean Scatter: Chi^2 Test.*

Table 51 presents the statistical analysis of scatter of the Object Assembly scores from the Modified Performance Mean. It shows that 75% of the Deteriorated Schizophrenics have Object Assembly scores well above the Modified Mean. Both the Unclassified and Paranoid Deteriorated Schizophrenics show this trend, and thus were combined for the statistical treatment in Table 51. These groups were considered separately on Vocabulary Scatter because the Deteriorated Paranoid cases did not show up as strikingly as the Deteriorated Unclassified cases. The Modified Mean Scatter shows that in both groups there is a considerable impairment of other Performance subtests, and it is this common scatter pattern which justifies combining the two groups here. The Simple Schizophrenics show the same tendency.

TABLE 51-A.—MODIFIED MEAN SCATTER OF OBJECT ASSEMBLY. *Percentage of Cases in Ranges of Scatter*

Group	No. of Cases	Percentages			
		$\leqq -2$	>-2 to <0	0 to $<+2$	$\geqq +2$
(P + U) Sch A	28	29	36	25	11
(P + U) Sch Ch	23	22	35	9	35
(P + U) Sch D	12	8	8	8	75
Depr	31	35	26	13	26
Depr—DN	24	25	29	17	29
Neurotics	59	31	31	29	10
Patrol	54	31	22	24	22

The first three Chi^2 tests in Table 51-B show again a significant trend for efficiency of performance on Object Assembly to increase with schizophrenic deterioration. Furthermore, the Deteriorated Schizophrenics are significantly different from the Depressives, who show the greatest impairment of all groups. The Chronic and especially the Deteriorated Schizophrenics are significantly better than the Neurotics, and the Deteriorated Schizophrenics are even significantly better than the Patrol.[99] In contrast to the Chronic and the Deteriorated Schizophrenics, the Acute

---

[99] The reader will remember that the term "better" here refers to efficiency on Object Assembly relative to the other Performance subtests; and does not refer to higher weighted scores.

Schizophrenics have a predominance of scores below the Modified Mean; thus they are not differentiated from the Depressives, the Neurotics, or the Patrol.

The fact that the Patrol is not significantly different from the Depressives as a whole, and shows only a trend to be different from the severely impaired Neurotic Depressives, is evidence of the easy vulnerability of this subtest even in Normals.

TABLE 51-B.—*Differential Significance of Distribution of Cases*

Groups Compared	Chi² (d.f. = 3)	Significance
(P + U) Sch A : (P + U) Sch Ch	5.53	10–20%
(P + U) Sch Ch : (P + U) Sch D	5.74	10–20%
(P + U) Sch A : (P + U) Sch D	16.56	<<1%
(P + U) Sch A : Depr	3.59	30–50%
(P + U) Sch A : (Depr − DN)	2.99	30–50%
(P + U) Sch Ch : Depr	1.82	50–70%
(P + U) Sch Ch : (Depr − DN)	.86	80–90%
(P + U) Sch D : Depr	9.04	2–5%
(P + U) Sch D : (Depr − DN)	7.01	5–10%
(P + U) Sch A : Neurotics	.28	95–98%
(P + U) Sch Ch : Neurotics	9.40	2–5%
(P + U) Sch D : Neurotics	25.62	<<<1%
(P + U) Sch A: Patrol	2.66	30–50%
(P + U) Sch Ch : Patrol	4.47	20–30%
(P + U) Sch D : Patrol	12.75	<1%
(Depr − DN) : DN	3.28*	5–10%
Depr : Neurotics	5.72	10–20%
(Depr − DN) : Neurotics	5.00	10–20%
Depr : Patrol	1.55	50–70%
(Depr − DN) : Patrol	4.47	20–30%
DN : Neurotics	2.99*	5–10%
DN : Patrol	2.73*	5–10%
DN : (P + U) Sch A	2.76*	10%
DN : (P + U) Sch Ch	3.94*	2–5%
DN : (P + U) Sch D	5.49*	2%

* Because of the small number of cases in DN and their massing in "≦−2" range, a Chi² test of a dichotomy ("≦−2", ">−2") was done.

We conclude that analysis of the Modified Mean Scatter gives, in general, the same results as the analysis of Mean Scatter made in connection with Special Table 2: it brings to further expression the tendency for efficiency on this subtest to increase with Schizophrenic deterioration, and reveals the trend for impaired efficiency in Depressives and even in the Neurotics and the Patrol. These findings for the Neurotics and the Patrol show the easy vulnerability of the visual-motor coordination required by this subtest.

7. Analysis of the Extreme Weighted Scores of the Object Assembly Subtest.

Finally let us turn to the distribution of weighted scores on Object Assembly in the various groups. Special Figure 2 represents the number of cases with low weighted scores less than 6, and shows that Object Assembly is the most vulnerable of all the subtests with respect to low weighted scores. There are 24 cases in our population with low weighted scores. It is striking that the Deteriorated Unclassified Schizophrenics, who on all the previous subtests have been heavily represented in Special Figure 2 with low weighted scores, have no such cases on Object Assembly, and the Deteriorated Paranoid Schizophrenics have only one case. This is the first indication on an absolute—that is, weighted score—level that the Object Assembly superiority of the Deteriorated Schizophrenics is not merely relative to the other scores.[100]

There are 7 Depressive cases having such low weighted scores, or about 1 out of every 4 Depressives. Strikingly enough, there are 5 cases from the Patrol, or about 1 out of every 11 Normals. Two of these 5 are well-adjusted cases; in other words 1 out of 16 well-adjusted Normals shows such a score. This further attests to the great sensitivity and vulnerability of this subtest, since even Normals whose efficiency is otherwise well-retained may drop extremely on it. The other cases are scattered among the Non-Deteriorated Schizophrenic groups, with the exception of 3 Neurotic cases.

Special Figure 3, representing the number of cases with high weighted scores equal to or above 15, shows that our population has 17 such cases. The Deteriorated Schizophrenics and the Simple Schizophrenics each contribute one case in this range. The other cases come mainly from the Neurotics (4 cases), the Normals (5 cases), and the Over-Ideational Preschizophrenics (2 cases).

A special inspection of low weighted scores, as shown in Table 52-A, reveals that scores below 4 occur almost entirely in Depressives, and especially Depressive Psychotics.

We conclude that extremely low weighted scores on this subtest occur most frequently in Depressives, but may occur in other groups because of the special vulnerability of Object Assembly to a variety of factors such as depressive, schizoid, and anxious trends. Extremely high weighted scores are most frequent in Neurotics and Normals, although other groups —Preschizophrenics, and even Deteriorated and Simple Schizophrenics— may find representation in this range.

It is of especial interest to examine the distribution of weighted scores divided into four ranges, as presented in Table 52-A. It will be seen that nearly half of the Depressive Psychotics have weighted scores of 4 or less, while such scores in all the other groups are exceptions. It is especially striking that more than 80% of the Deteriorated Schizophrenics have weighted scores of 9 or more, again showing that their superiority on this subtest is not merely relative but also absolute. As one passes from the Deteriorated, through the Chronic, to the Acute Schizophrenics, the representation in the two upper ranges of weighted scores decreases.

---

[100] One might speculate here whether deterioration actually *improves* the scores of Object Assembly or merely does not *impair* them as much as it does the other subtest scores. We have as yet insufficient material to reach any conclusions on this point.

The Patrol breakdown is also of considerable interest. It becomes clear that many more low weighted scores occur in the Anxious than in the Non-Anxious Patrol; in the lower two ranges of weighted scores 33% of the Anxious Patrol is represented, and only 6% of the Non-Anxious Patrol. In the previous statistical analyses of Object Assembly this differentiation between Anxious and Non-Anxious Patrol was not as clearly expressed, but the findings here are consistent with the contention—and other evidence—that anxiety encroaches upon efficiency of performance.

TABLE 52-A.—*Distribution of Weighted Scores on Object Assembly*

Group	No. of Cases	Percentage of Cases			
		0–4	5–8	9–13	14–17
(P + U) Sch A	28	7	43	50	—
(P + U) Sch Ch	23	4	30	57	9
(P + U) Sch D	12	—	17	67	17
DP + DI	15	47	20	33	—
DSN + DN	16	6	44	44	6
Neurotics	59	5	25	58	12
Patrol	54	6	19	65	11
Patrol Anx	36	8	25	56	11
Patrol Non Anx	18	—	6	83	11
Patrol Sch	12	8	42	50	—
Patrol Non Sch	42	5	12	69	14
Patrol Depr	16	—	38	50	12
Patrol Non Depr	38	8	11	71	11

With the exception of Digit Span, this is then the only subtest which shows any impairment due to anxiety. Even here, however, the impairment in anxious cases is less significant than it was on Digit Span, demonstrating again the specificity of the effect of anxiety on Digit Span. These results may also indicate indirectly that "attention" plays a rôle in Object Assembly performance. Concentration on small details of the jig-saw pieces, and no consideration of the meaning of the wholes, impairs rather than helps performance. These results may also indicate that "pattern coherence" as seen in Object Assembly performances, and "out-of-pattern" relationship as seen in Digit Span performance, may be related.

TABLE 52-B.—*Differential Significance of Distribution of Cases*

Groups Compared	Chi^2 (d.f. = 3)	Significance
(P + U) Sch A : (P + U) Sch Ch	3.19*	20%
(P + U) Sch Ch : (P + U) Sch D	1.42*	30–50%
(P + U) Sch A : (P + U) Sch D	7.43*	2–5%
(P + U) Sch A : (DP + DI)	9.51†	<1%
(P + U) Sch Ch : (DP + DI)	10.21	1–2%
(P + U) Sch D : (DP + DI)	9.53	2–5%
(P + U) Sch D : (DSN + DN)	3.53*	10–20%
(P + U) Sch A : Neurotics	5.58*	5–10%
(P + U) Sch Ch : Neurotics	.29	95–98%
(P + U) Sch D : Neurotics	1.28	70–80%
(P + U) Sch A : Patrol	7.46*	2–5%
(P + U) Sch Ch : Patrol	1.32	70–80%
(P + U) Sch D : Patrol	.84	80–90%
(DP + DI) : (DSN + DN)	6.62*	2–5%
(DP + DI) : Neurotics	18.82	<<1%
(DP + DI) : Patrol	17.10	<<1%
(DSN + DN) : Neurotics	2.23*	30–50%
(DSN + DN) : Patrol	3.96*	10–20%
Neurotics : Patrol Non Anx	4.82*	5–10%
Patrol Anx : Patrol Non Anx	5.29	10–20%
Patrol Depr : Patrol Non Depr	7.08	5–10%
Patrol Sch : Patrol Non Sch	6.94	5–10%

* Where the number of cases in one extreme was none or few, the extreme was merged into the adjacent group, changing d.f. from 3 to 2.

† There were no high extremes in either of these groups, making d.f. = 2 instead of 3.

If so, this would to some extent explain the strikingly good achievement of some Schizophrenics on both of these subtests.

The Patrol breakdown also shows that similar impairments may result from the presence of schizoid trends. The Schizoid Patrol has an almost identical distribution with the Acute Schizophrenics. The breakdown into Depressive and Non-Depressive Patrol is less striking, but 38% of the Depressive, while only 19% of the Non-Depressive, Patrol are in the lower two weighted score ranges.

Table 52-B, presenting the differential significance of these distributions, shows that the described trends are in general significant or close to significance.

8. General Diagnostic Conclusions:

(a) Impaired efficiency on the Object Assembly subtest may be a reflection of depressive and/or anxiety trends. If the impaired efficiency is essentially the consequence of depression, the score on this subtest will be much below the Vocabulary level but will not differ from the other Performance subtest scores, as depression tends to lower all these rather uniformly. If the impaired efficiency is essentially the consequence of anxiety, especially neurotic anxiety, the scores will not only be significantly below the Vocabulary level but also below the level of the other Performance subtest scores, which do not appear especially vulnerable to encroachment by anxiety. If anxiety and depression are both present, the Object Assembly score will, because of the additional anxiety factor, be even lower than the other Performance subtest scores, which have been lowered mainly by the depressive trend alone.

(b) Among the Schizophrenics, as one progresses from the acute delusional disorientation, panic, and anxiety of the Acute Schizophrenics to the increasing blandness in the Chronic and Deteriorated Schizophrenics, one finds less and less encroachment upon the efficiency of Object Assembly. The Object Assembly score in Deteriorated cases will not only be on the same level as the Vocabulary score, but will be significantly above the level of the other Performance subtest scores, which in general are lowered by the increasing Schizophrenic deterioration. The blandness of the Simple Schizophrenics, similar to that of the Deteriorated Schizophrenics, results in their also doing relatively well on this subtest. In other words, if the Object Assembly score is well-retained while the other Performance subtest scores show considerable impairment, it is likely that one is dealing with a Chronic or Deteriorated Schizophrenic.

(c) The Object Assembly subtest appears to be especially sensitive and vulnerable, and therefore one may find impaired efficiency on it in many different kinds of disturbances, even in Normals who show anxious, schizoid, or depressive trends.

(d) These considerations hold true even on the absolute weighted score level. The Deteriorated Schizophrenics have a predominance of cases with good or excellent scores on this subtest; the Depressive Psychotics have a significant number of cases with extremely low weighted scores; and even the Normals are represented in the extremely low weighted score range, which evidences the especial vulnerability of this subtest.

P. BLOCK DESIGN

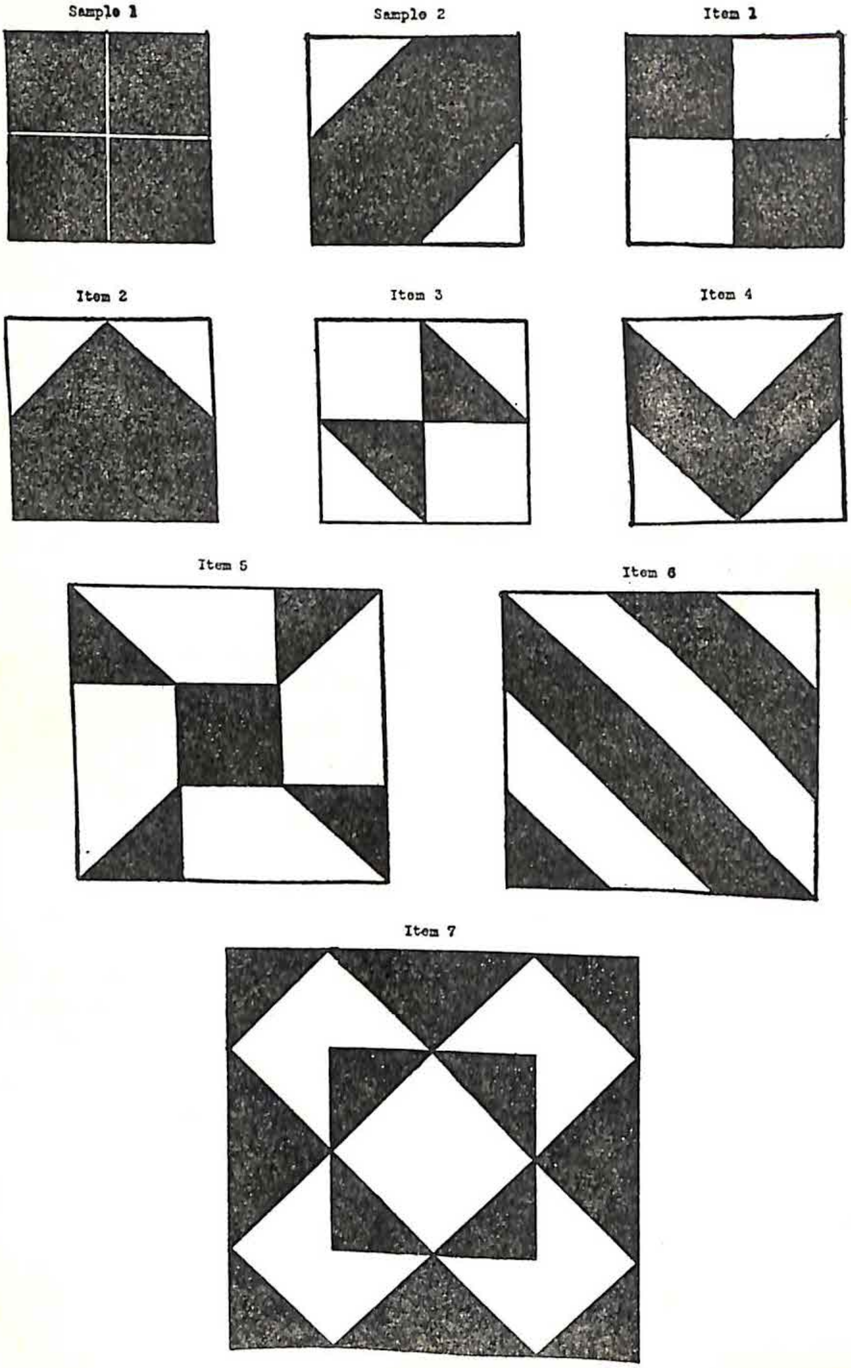
1. Introduction. The Block Design subtest is one of the subtests of visual-motor coordination. It consists of seven items; these are preceded by two sample items which, if difficult for the subject, are demonstrated to him.

The two sample items and the first four test items consist of 4 blocks each to be juxtaposed so as to form a given design; the next two items consist of 9 blocks each; the last item consists of 16 blocks. The blocks are those used in the Koh's Block Test, each having a blue, a white, a red, a yellow, a blue/yellow, and a red/white side; only the red, white, and red/white sides are used in this subtest. The blocks in each completed design constitute a square, and all the designs show some symmetry, as may be seen in Figure 17. In the items No. 1, No. 3, and No. 5, it is easy for the subject to infer which blockfaces should be juxtaposed. The designs of items No. 2, No. 4, and No. 6 give no such help. The design of No. 7 occupies a middle position, giving vague indications of the blockfaces to be used.

The items are timed, but the time allowances are quite liberal, though not so liberal as on Object Assembly. The passing of each item within the time limit is credited with 3 raw score units, and additional time-credits from one to three are awarded for speedy performance. Successful performance on all items without time credits—21 raw-score units—yields a weighted score of 10; thus it is identical with that obtainable on a completely correct Object Assembly performance without time credit. It is true that partially correct performances on Object Assembly obtain partial credit, while on Block Design only flawless performance gets credit; but the fact that the obtaining of a weighted score of 10 depends in Object Assembly on success on 3 items, and in Block Design on 7 items—on several of which time-credit is easily obtained—makes Block Design much more refractory to impairment than Object Assembly. This also shows up in the Special Table 3, where Block Design shows the highest average score for our population of all the Performance subtests.

2. Visual-Motor Coordination in the Block Design Subtest. Visual-motor coordination in the Block Design subtest can be characterized as occupying a middle position between its rôle in Object Assembly and its rôle in Digit Symbol.

In Object Assembly, individually different pieces with predetermined rôles are to be put together into a pattern inherent to these parts. Thus



G. 17.—Block Design Patterns

visual-motor coordination, and particularly visual organization, play a *productive* rôle, in the sense that indications of the parts must be developed into an anticipatory image of the whole and this whole be put together out of the parts given.

In Digit Symbol, the rôle of visual-motor coordination is an *imitative* one; that is, visual organization is concerned with samples given to be copied, though the motor action of copying some symbols can be expedited by the subject's breaking them down into units of motor performance.

In Block Design, the rôle of visual-motor coordination is *reproductive.* On the one hand, the patterns to be recreated are kept before the subject, somewhat as in Digit Symbol; on the other hand, they are to be put together from parts, somewhat as in Object Assembly.

Unlike Digit Symbol, however, the given sample patterns on Block Design always must be differentiated into their parts, which are to correspond not to units of ease of motor performance but rather to units equal to those found among the blockfaces. Unlike the Object Assembly subtest, the pattern that must be constructed in Block Design is given visually and is to be reproduced out of blocks which are identical, interchangeable, and not inherently carriers of the "meaning" of the pattern to be constructed; that is, a red/white blockface in the stripe pattern of No. 6 is not a carrier of the meaning "stripes" in the same sense that a leg is a carrier of the meaning "man" or a nose is a carrier of the meaning "face".[101]

Thus, Object Assembly being constructed out of units not interchangeable and hence inflexible, and Digit Symbol allowing for quite flexible drawings which need convey only the salient features of the configuration of the symbols, we may say that the interchangeable but precise units of Block Design place it in a middle position with regard to flexibility.

The rôle of visual-motor coordination in Block Design will become clearer if we consider the steps usually taken in the course of performance. The first step is the inspection of the item design. Here only visual organization comes into play. Its function and achievement in this first phase depend upon two factors.

The first factor is the acuity of visual-organization in the subject, which (a) may immediately differentiate the pattern into its parts, and prescribe a priori how the pattern can be reproduced out of the blocks given; or (b) may give only a vague idea of the pattern as a whole, with the concrete realization of one or two isolated parts and the blocks to be used in reproducing these parts—that is, give a crystallized idea only of a starting point; or (c) may give no ideas of either whole or parts, whereupon the subject turns to the blocks to find in them some reminder of the pattern which will offer a starting point.

---

[101] It was Goldstein (11) who emphasized first that a job of breaking down the pattern into its constituent parts is a matter of "abstract attitude"—the same function which he identified as underlying performance on any kind of sorting behavior, whether it is that on the Weigl Color-Form Test, the Sorting Test, or the Hanfmann-Kasanin Test. These tests which Goldstein considers tests of "abstract attitude" are considered by the present authors as tests of concept formation. The analytic and synthetic task implied by Block Design is related to the conceptual analysis underlying successful performance of concept formation tests.

The second factor is the patterns themselves; some—1, 3, 5—lend themselves easily to differentiation in terms of blockface units, while others—2, 4, 6—convey only general impressions.

The second step is usually to turn to the blocks. Those subjects who have visually differentiated the pattern into its parts will turn to the blocks to execute their visual plan. Even here there will be great individual variation. On a pattern requiring only red/white faces, some of these subjects will turn all the blocks to red/white before proceeding; others will use first random blocks which are turned to that face. In both cases the security of approach will reveal to the examiner the superior visual organization; the latter subjects will usually be more flexible and economic, the former more systematic and rigid.

Superiority of visual organization is not always indicative of superiority of visual-motor *coordination*. The differentiation of the parts to be used may be excellent, yet the handling of the blocks in an effort to find the right face can be fumbling and time-wasting; or the certainty of the visual pattern may lead to hasty motor action which is not guided and corrected in its course by the visual organization, and which may result either in wrongly-placed blocks or in the removal of rightly-placed ones. Both an insecure performance which repeatedly compares the constructed parts with the pattern, and an over-confident performance which does not make such comparisons often enough, are detrimental to efficiency. The efficient performance is an even balance of regard for the pattern, for the parts already constructed, and for the number, character, and position of the remaining spaces and blocks.

The rôle of visual-motor coordination becomes most obvious in those subjects who in the beginning form only a vague undifferentiated idea of the structure of the pattern and who isolate a secure starting point. By their handling of the blocks one can note the tacit problems, such as, "Are all red/white blockfaces congruent?" or "Does it make a difference which one I choose?" Once they find the block that will do as a starting point, we see them turning back to the pattern, and from this vantage point another—usually adjacent—part of the pattern becomes better differentiated for them; they turn back to the blocks again, manipulating them until they seem to "click". In this manipulation they will repeatedly bring the new block with the desirable face up, but will turn to the wrong face because their movements are too rash for them to notice that "it clicks"; that is, they move the blocks too fast for the visual organizing process to get hold of it. Blocks once in the right position are often kept moving, for the same reason. Often the failure to fall back at the right moment upon the pattern for guidance will be the cause of such fumbling. A lucky coincidence of correct pace, right position, and checking with the pattern will clinch the point. *Good visual-motor coordination provides the maximum likelihood for such "coincidences"*.

Insufficient interaction between pattern and blocks may be seen at times when in items No. 2, No. 3, or No. 5 the white face blocks will not be used, and their correct space will be left empty. In this example visual organization is rather keen, but the blocks are disregarded. Cases where visual organization is vague and, at the same time, the blocks are not sufficiently taken into consideration, are seen when the stripes of item No. 6 become two thin stripes and one thick stripe, or even two thick stripes, or when the middle white square of item No. 7 is represented by the white-face of one or of four blocks.

Subjects who form no visual-organization of the pattern turn, for better or worse, to the blocks for a clue. Some of these subjects, by progressive visual differentiation, soon arrive at the same position as the subjects last described; others get nowhere. Random beginnings characterize them, and some of them come neither to a crystallization of the visual organization nor to any results. Others, by trial and error, may reproduce the pattern piece by piece without at any time—or even at the end—having an organized picture of other than isolated parts, and steps in construction, of the pattern. This procedure is again governed by the "pattern coherence" discussed in connection with Object Assembly. Prevalence of such procedure often comes to expression in constructing out of the blocks a pattern whose contour is other than square, where the relation of any two blocks may be as required by the pattern but where the total pattern has not been experienced. Such a solution, as the result of persevering—that is, not as a result of vague visual organization which progressively crystallizes, but rather of absence of overall visual organization—is rarely found in our material in cases other than psychotics.[102a]

Our emphasis on visual-motor coordination should not veil the fact that the work of visual organization in this test implies concept formation as evidenced in the analytic and synthetic phases of performance.[102b]

[102a] It should be made explicit that these conclusions do not take account of the achievements of children and mental deficients, which have not been studied by us.

[102b] It will be worthwhile to mention here one more facet of such blind procedure by quoting a passage from a letter from Dr. Martin Scheerer: "I think it would be very desirable if you could call attention to the congruencies between your and our findings wherever they occur. It is so unnecessarily often that disagreements have been stressed in science and agreements have been neglected because of prestige

3. Administration. A few points of administration not enlarged upon by Wechsler should be taken up here.

(a) The subject is to be told to indicate to the examiner when he is finished. In successful performance, however, the time-credit is given according to the time of actual completion and not the time of indication of completion. Completion is defined as a solution not afterwards changed.

(b) After a subject has stated that he is finished when his design is not correct, or that he cannot do the item, indication that he is wrong or help in proceeding should be given by the examiner; and it should be tested how much help, if any, brings completion. Such performances are not credited. If the error is minute—one or two blocks in their correct place, but not correctly duplicating the pattern—no help should be given and the subject should have a chance to infer from the examiner's silence that recheck is necessary. If this is successfully done within the time-limit, the item should be considered passed, though no extra time-credit should be given.

(c) Understanding and restudy of the visual-motor coordination underlying the Block Design performance is not possible without careful recording of the procedure the subject follows.

4. Qualitative Item Analysis. The Block Design subtest consists of 7 items. Quantitative analysis of the types of visual-motor performances discussed above is indispensable for future research into this function; our notes on this material were, regrettably, not systematic enough to serve as a basis for quantitative evaluation. Thus we shall give only a qualitative item-analysis here.

Even on the sample items, indications which arouse suspicion of the presence of psychotic or prepsychotic conditions may be observed: as for instance, if the first sample is considered performed by the subject when he has turned one block red-face up instead of four, or if he attempts to place the four blocks on the pattern-card, or if he claims that solution is impossible "because these blocks do not have a black line" (referring to the black dividing-lines on the pattern). The second sample also gives such indications if the square outline of the pattern is disregarded, and the subject thinks that the task is solved. Other difficulties on the second sample

---

factors overshadowing the common interest in the nature of the problem that I think we should be glad to announce agreements if they have been found in different methods of investigation. You mention, for instance, 'Another form of apparent success without understanding that the observed was a lack of recognition in some subjects as to the fact that different portions of design could be identically constructed.' You have here on a higher level (because of the sixteen block design) what we found on a lower level in using four blocks where the patient is unable to conceive that the same distribution of colors occurs on all of the four blocks; he therefore looks for a third block and fourth if he can't find the particular color on the second block, to repeat that color, which he found successfully on the first block" (11, pp. 43–48).

are frequent enough not to be suspicious unless they remain uncorrected after help showing the use of one red/white face in a corner.

The seven test items divide into three groups: (a) No. 1, No. 3, and No. 5, on which it is relatively easy to differentiate the blockfaces out of which it is to be constructed; (b) No. 2, No. 4, and No. 6, on which it is difficult to differentiate the blockfaces; (c) No. 7, on which the difficulty is intermediate, partly because it has misleading areas which look like differentiated blockfaces, and partly because the differentiation of blockfaces is by no means as difficult as on No. 4 and 6.

One might formulate that these differences of difficulty are based on the extent to which the blockface elements lose their independence and submerge in the pattern of which they are parts. In group (a) the perceptual differentiation of the patterns coincides grossly with their block structure; in group (b) the patterns, while not less differentiated perceptually, are however not identical with the single blockfaces, and can only be duplicated by more or less complex combinations of parts of blockfaces.

In group (a) the items show an increasing order of difficulty, because only No. 1 is unequivocally differentiated into blockfaces, and the white spaces in No. 5 are not. Failing items No. 1 or No. 3, or even having a prolonged solution time on them, is malignant indication—though there is one exception, that persons with very rigid visual organization may carry over to No. 1 the use of the red/white faces they learned on Sample 2. This may occur even in normal subjects. No. 5 may be missed merely as a result of temporary inefficiency. Particularly frequent is the correct placing of the cross consisting of 1 red and 4 white faces, while the direction of the red/white faces offers great difficulty. This difficulty usually is connected with that aspect of visual-motor coordination which is referred to frequently as "spatial orientation". Attempts to construct the middle red face in No. 5 out of four red blockfaces is a malignant indication.

Similar increase of difficulty is seen in group (b) where in No. 2 the blocks only partly lose their contours, while in No. 4 they lose it considerably more, and in No. 6—with the exception of the somewhat perceptible corner blocks—they lose it almost entirely. No. 2 should not be missed, because its principle was present in Sample 2. No. 4 can be missed as a result of temporary inefficiency. No. 6 can be missed simply because the visual organization function of a normal subject may not be specifically developed. In both No. 4 and No. 6 the corners serve as rather easily differentiated elements for the starting points of performance. For a subject to disregard the square contour of the pattern, and nevertheless show evident confidence and anticipation of success, is a psychotic indication. Constructions made of red-face rows and white-face rows placed at a 45° angle arouse suspicion.

Item No. 7 is the most complex, though from the point of view of visual organization not the most difficult, item. The difficulty here is frequently the same as that encountered in the four corner blocks of No. 5—the direction of red/white faces. Temporary inefficiency can be so massed as to become easily defeating. Only queer constructions, disregarding length of rows and contour of pattern, can be considered pathognomonic of the presence of psychosis. Depressive patients are usually so overwhelmed by the amount of work required on this item that they usually are distinguished by their early attempts to give up.

5. Vocabulary Scatter and Mean Scatter: "t"-Test.

Let us turn now to the statistical evaluation of our results on Block Design. Graph 4 on Special Figure 1 represents the average Vocabulary Scatter of Block Design for all our groups. There are 3 significant trends indicated by this Graph: (a) Block Design appears to be the sturdiest Performance subtest, since in most of the groups its graphline is closer to the horizontal axis—representing the Vocabulary level—than that of any other Performance subtest; (b) the main exception to this trend of having a well-retained Block Design score occurs in the Depressive groups, especially the Depressive Psychotics, but also in the Severe Neurotic Depressives and the Anxiety and Depression group; (c) in none of the Schizophrenic groups is Block Design efficiency especially impaired, but the Deteriorated Schizophrenics do not excel on Block Design as they do on Object Assembly.

It becomes immediately apparent, especially if the Object Assembly results are kept in mind, how different are the scatter patterns of the Schizophrenics and the Depressives. On the visual-motor tests, such as Object Assembly and Block Design, the Schizophrenics do not show outstanding impairment; it is on these tests that the Depressives show great impairment.

For a more detailed analysis of these trends, let us turn to Special Table 1, which presents the average scatter from the Vocabulary level and its significance for each group. The most striking feature of this Table is that the two Depressive Psychotic groups and the Severe Neurotic Depressives show drops below Vocabulary unsurpassed by any of the other groups, and the significance of these drops is clearly established. It is interesting to note that as one progresses from the Psychotic Depressives to the Neurotic Depressives, the average drop below Vocabulary decreases in size and significance, so that the Neurotic Depressives are equalled or surpassed by several other clinical groups. Consistent with these findings, which show the great impairment of Block Design as the consequence of depression, is the fact that the Anxiety and Depression group—which clinically shows strong depressive trends—has the greatest drop below Vocabulary of any group other than the Depressives.

It is consistent with the description of the trends in the graph that in only one of the Schizophrenic groups—the Acute Unclassified Schizophrenics—is there an average drop which is on the borderline of significance. However, the average drop in this group is not very large; and the significance implies a mild but consistent impairment on Block Design in this group. If one looks back to the achievements of the Schizophrenics on Picture Arrangement and Picture Completion, their striking impairment is in contrast to their mild impairment on Block Design. We have here the emergence of a rather clear-cut Schizophrenic pattern on the Performance subtests: the two essentially visual Performance subtests show striking impairment, while the visual-motor Block Design subtest does not. This is not true for the Depressives, who show more or less significant drops on all the Performance subtests. The differential diagnosis between Depression and Schizophrenia on the basis of the scatter patterns of these groups becomes increasingly apparent as we progress through the analysis of the Performance subtests.

Even the Well-Adjusted and Borderline-Adjusted Patrol show more or less significant drops on Block Design below the Vocabulary level, although the average of these drops is not great.

Before proceeding to draw any diagnostic conclusions, let us examine these results on Block Design in terms of the scatter from the Performance Mean. This analysis is presented in Special Table 2. The most striking feature of the column presenting the average scatter and its significance is that 21 out of our 22 groups have a positive average scatter from the Performance Mean. The only exception is the Psychotic Depression group, whose drop on Block Design below the Performance Mean is significant. If one turns to the size and significance of the positive scatters, they are seen to be greatest in the Schizophrenics and the Preschizophrenics. The finding that practically all of the groups are above their Performance Mean on Block Design attests to the sturdiness of this subtest. That the size and significance of such positive scatter are greatest in the Schizophrenic groups brings more clearly to expression their characteristic scatter pattern to have a well-retained Block Design score while their other Performance subtest scores, especially those on the primarily visual subtests, are significantly impaired.

The fact that the Psychotic Depressives have a significant negative scatter on Block Design shows how extreme depression will seriously encroach upon this visual-motor subtest even more than it does on the other Performance subtests. On none of the preceding Performance subtests have the Psychotic Depressives had a negative scatter *below the Performance Mean* which was significant; this finding appears to be therefore of diagnostic value. Among the Depressives only the Neurotic Depressives—who, as we have seen in terms of Vocabulary Scatter, show the least impairment on Block Design—have a trend to be somewhat better on this than on the other Performance subtests. The size of this superiority is however small, especially when compared to that of the Schizophrenic groups.

None of the Neurotic or Normal groups, excepting the Maladjusted Patrol, have a positive scatter equal in size and significance to that of the Schizophrenics and Preschizophrenics.

It is of especial interest to note that the Deteriorated Schizophrenics show no greater negative Vocabulary Scatter than the Acute or Chronic groups, and in the Mean Scatter may—as witness the Deteriorated Unclassified Schizophrenics—be even superior to these groups. Though this superiority of the Deteriorated Schizophrenics is not so marked as it was in the case of Object Assembly, the fact remains that on Block Design, in contrast to their achievements on many of the other subtests, they are not more impaired than the other Schizophrenics. We believe the considerations advanced in regard to Object Assembly apply also to Block

Design—namely, that the Deteriorated Schizophrenics may do well on this visual-motor subtest by a method of achievement much different from that of Normals. They proceed by means of a random and casual shifting of the blocks, putting two blocks together where they "click" grossly with a part of the pattern presented, so that in an inefficient and aimless manner the piece-meal visual impressions become a guide to a gradual reconstruction of the pattern. Inasmuch as on Block Design, unlike Object Assembly, partial scores are not given and time allowances are more strict, the results on scores and scatter of the Deteriorated Schizophrenics are less striking.

We conclude that (a) Block Design is a sturdy subtest, suffering impairment mainly where depressive trends are strong. (b) Increasing severity of depression results in increasing impairment on Block Design, pushing the score down much below the Vocabulary level and, in the case of the Psychotic Depressives, even below the generally impaired Performance Mean. (c) Schizophrenics, in contrast to their disorganization on the other subtests, particularly those which are primarily visual, do not show any special or significant impairment on Block Design. This contrast appears to be a characteristic Schizophrenic scatter pattern, which is of importance in the differential diagnosis of Depressive Psychosis and Schizophrenia. (d) This schizophrenic pattern is seen in the Preschizophrenic groups, which also show a significant superiority of Block Design score over the other Performance subtest scores. (e) Although Neurotic and Normal groups may show a consistent drop of Block Design below the Vocabulary level, the impairment is of a very mild degree; and the Block Design score is likely to be somewhat superior to the scores of the other Performance subtests. (f) Therefore, great impairment on Block Design is a generally reliable indicator of depressive trends, the severity of which may be estimated by the extent of impairment.

6. Vocabulary Scatter: Chi^2 *Test.*

The analysis of Vocabulary Scatter of the Block Design subtest in terms of percentage of cases falling into ranges of scatter is presented in Table 53. This Table shows how the Depressive Psychotics are significantly worse, and the Depressive Neurotics tend to be worse, than the Schizophrenics; while the Neurotics, even the well-performing Hysterics and Mixed Neurotics, are hardly distinguished from the Schizophrenics. The depressive factor in the Anxiety and Depression group, the depressive-like sluggishness of the Neurasthenics, and the general tendency of the Obsessive-Compulsives to be inefficient on Performance subtests, differentiate these three groups from the Hysterics and the Mixed Neurotics. The Patrol shows only a trend to be better than the Schizophrenics, which is a remarkable finding since we are actually comparing the two extremes of the continuum extending from adjustment to profound maladjustment. The amazing retention of Block Design scores in the Schizophrenics is here brought strikingly to our attention. The Depressive

Psychotics are, of course, significantly differentiated from all the other groups, even from the Depressive Neurotics; and the Depressive Neurotics in turn show greater or lesser trends to be more impaired than the other groups.

The Patrol breakdown contributes nothing significant in a positive sense, except the fact that mild depressive trends in Normals do not encroach upon the efficiency of Block Design performance as they do on other subtests. This finding again attests to the sturdiness of Block Design.

We conclude that this analysis also reveals two significant trends in our clinical groups: first, that Block Design efficiency is well retained in Schizophrenia; secondly, that depression of Psychotic or Neurotic degree appears to be the most potent factor in impairment of Block Design.

TABLE 53-A.—VOCABULARY SCATTER OF BLOCK DESIGN. *Percentage of Cases in Ranges of Scatter*

Group	No. of Cases	Percentage of Cases		
		≧0	−1 to −3	<−3
(P + U) Sch	63	49	24	27
DP + DI	15	—	33	67
DSN + DN	16	19	56	25
Total Neurotics	59	41	34	25
Hy + MN	27	48	37	15
A & D + O-C + Neuras	32	34	31	34
Total Patrol	54	52	37	11
Patrol Anx	36	58	31	11
Patrol Non-Anx	18	39	50	11
Patrol Depr	16	50	38	12
Patrol Non-Depr	38	53	37	11
Patrol Sch	12	58	25	17
Patrol Non-Sch	42	50	40	10

A last point may be made about these distributions: the Schizophrenics, in spite of the general tendency to remain unimpaired, still have one-fourth of their cases in the extreme negative scatter range. The causes for this may be two: (a) a schizophrenic psychosis does not preclude the possibility of accompanying severe depressive trends; (b) in some Schizophrenics disorientation and confusion may be severe enough to make efficient performance on Block Design impossible.

The possible presence of depressive trends in cases not diagnosed as depressives is also applicable to the Neurotic groups. Why 10% of the

Patrol should have great negative scatter cannot be explained on the basis of our present material. It is nonetheless of interest that the Anxious and Non-Anxious Patrol are not significantly differentiated, although they showed a trend to be on Object Assembly. This is an indication that mere anxiety and concurrent attention disturbance is not a potent factor in impairing efficiency on Block Design, which is rather a test of spatial-conceptual analysis and concentration.

TABLE 53-B.—*Differential Significance of Distribution of Cases*

Groups Compared	Chi^2 (d.f. = 2)	Significance
(P + U) Sch : (DP + DI)	13.40	<<1%
(P + U) Sch : (DSN + DN)	4.01	10–20%
(P + U) Sch : Neurotics	1.63	30–50%
(P + U) Sch : (Hy + MN)	2.39	30%
(P + U) Sch : Patrol	5.40	5–10%
(DP + DI) : (DSN + DN)	6.86	2–5%
(DP + DI) : Patrol	23.29	<<<1%
(DP + DI) : Neurotics	12.08	<1%
(DSN + DN) : Patrol	5.84	5–10%
(DSN + DN) : Neurotics	3.32	10–20%
(DSN + DN) : (Hy + MN)	3.74	10–20%
(A & D + O-C + Neuras) : (Hy + MN)	3.06	30–50%
(A & D + O-C + Neuras) : Patrol	7.12	2–5%
Patrol Anx : Patrol Non-Anx	2.04	30–50%
Patrol Sch : Patrol Non-Sch	11.90	50–70%

7. Modified Mean Scatter: Chi^2 Test.

Let us turn to the distribution of the percentage of cases into ranges of scatter measured from the Modified Performance Mean, presented in Table 54. The Chi^2 tests of the significance of the differences in distribution indicate a trend for the Schizophrenics—especially the Deteriorated Unclassified Schizophrenics—to be significantly above the Modified Performance Mean on Block Design, and for the Depressive Psychotics to show a trend toward special impairment on Block Design relative to the other Performance subtests.

We conclude that the differentiation between Schizophrenics and Depressives can be made not only on the basis of Vocabulary Scatter, where the Depressives drop significantly while the Schizophrenics do not, but also—though less incisively—by the Schizophrenics' superiority on Block Design over the other Performance subtests, which is absent in the Depressives. In other words, the pattern that has emerged from the study of the Performance subtests is one of the Schizophrenics showing little impairment on Block Design in contrast to the other Performance subtests, especially those which are primarily visual, and the Depressives showing a general impairment on all the Performance subtests, frequently Block Design especially.

TABLE 54-A.—MODIFIED MEAN SCATTER OF BLOCK DESIGN. *Percentage of Cases in Ranges of Scatter*

Group	No. of Cases	Percentage of Cases			
		≦−2	>−2 to <0	0 to <+2	>+2
(P + U) Sch	63	2	29	33	37
(P + U) Sch (A + Ch)	51	2	31	33	33
U Sch D	7	—	14	14	71
(DP + DI)	15	27	27	33	13
(DSN + DN)	16	6	38	38	19
Neurotics	59	10	20	37	32
Patrol	54	6	30	48	17

TABLE 54-B.—*Differential Significance of Distribution of Cases*

Groups Compared	Chi^2 (d.f. = 3)	Significance
(P + U) Sch (A + Ch) : (DP + DI)	11.44	<1%
U Sch D : (DP + DI)	8.06	1–2%
(P + U) Sch (A + Ch) : (DSN + DN)	1.77	30–50%
U Sch D : (DSN + DN)	3.86*	5%
(P + U) Sch (A + Ch) : Neurotics	3.01	20–30%
U Sch D : Neurotics	5.32	5–10%
(P + U) Sch (A + Ch) : Patrol	4.42	10–20%
U Sch D : Patrol	10.52	<1%
(DP + DI) : Neurotics	4.06	10–20%
(DSN + DN) : Neurotics	1.54	30–50%
(DP + DI) : Patrol	5.91	5%
(DSN + DN) : Patrol (too close to test)		
Neurotics : Patrol	5.24	5–10%

* Due to the small number of cases, a dichotomy was tested: "≧+2", "<+2".

8. *Analysis of the Extreme Weighted Scores of the Block Design Subtest.*

Let us turn now to the analysis of the distribution of weighted scores on Block Design.

Special Figure 2 indicates that there are 17 cases with extremely low scores (less than 6). Of these, 8 belong to the two Depressive Psychotic groups and 2 to the two Depressive Neurotic groups; in other words, 60% of the extremely low weighted scores are contributed by the Depressives. The remaining 40% is composed of various groups, including even one Border-Adjusted Patrolman. Here again depression is seen as the potent factor impairing Block Design.

TABLE 55-A.—*Distribution of Weighted Scores on Block Design*

Group	No. of Cases	Percentage of Cases			
		0–7	8–10	11–13	14–17
(P + U) Sch (A + Ch)	51	16	29	31	24
(P + U) Sch D	12	25	42	17	17
(DP + DI)	15	73	27	—	—
(DSN + DN)	16	31	31	31	6
Neurotics	59	12	25	36	27
Neurotics − (A & D + Neuras)	43	9	23	33	35
(A & D + Neuras)	16	19	31	44	6
Patrol	54	4	28	39	30
Patrol Anx	36	6	28	36	31
Patrol Non-Anx	18	—	28	44	28
Patrol Depr	16	6	25	38	31
Patrol Non-Depr	38	3	29	39	29
Patrol Sch	12	8	25	17	50
Patrol Non-Sch	42	2	29	45	24

The bar in Special Figure 3, representing the frequency of extremely high weighted scores of 15 or more, is composed of 23 cases. Thus Block Design has the highest number of extremely high weighted scores of all the Performance subtests, a fact which re-emphasizes its stability. 16 of these 24 cases—two-thirds—come from the Schizophrenic and Preschizophrenic groups. This is the only subtest in which the Schizophrenics have such a high representation in the high weighted score range. Of all the Depressives there is only one Neurotic Depressive in this range; the rest of the cases are either Neurotics or Patrolmen. If we turn to Table 55-A, which presents the distribution of the weighted scores on Block Design into four ranges, and to Table 55-B, which presents the differential significance of these distributions, we see that the Schizophrenics are not worse than any of the groups and are even superior to the Depressive Psychotics. Only the Patrol shows a tendency to be superior to the Schizophrenics.

The Chi^2 tests indicate that the drop of weighted score increases with the severity of depression; the two Depressive Psychotic groups show only a trend to be different from the Severe Neurotic Depressive group, but are significantly different from the Neurotic Depressive group. Depressive Psychotics, of course, are significantly worse than the Neurotics and Patrol; even the Severe Neurotic Depressives are significantly worse than the Neurotics.

TABLE 55-B.—*Differential Significance of Distribution of Cases*

Groups Compared	Chi^2 (d.f. = 3)	Significance
(P + U) Sch (A + Ch) : (P + U) Sch D	1.88	50–70%
(P + U) Sch : (DP + DI)	21.40	<<<1%
(P + U) Sch : Neurotics	1.81	50–70%
(P + U) Sch : Neurotics − (A&D + Neuras)	.73	80–90%
(P + U) Sch : Patrol	6.71	5–10%
(P + U) Sch (A + Ch) : Neurotics	.73	80–90%
(P + U) Sch (A + Ch) : Neurotics − (A & D + Neuras)	2.10	50–70%
(P + U) Sch (A + Ch) : Patrol	4.66	20%
(P + U) Sch (A + Ch) : Patrol (1)	6.45	5–10%
(DP + DI) : DSN	3.83*	10–20%
(DP + DI) : DN	11.34*	<1%
(DP + DI) : (DSN + DN)	8.40*	1–2%
(DP + DI) : Neurotics	28.42*	<<<1%
(DP + DI) : Patrol	40.80*	<<<1%
DSN : DN	3.21	30–50%
DSN : Neurotics	8.53	2–5%
DSN : Neurotics − (A&D + Neuras)	9.63	2–5%
Neurotics − (A&D + Neuras) : (A&D + Neuras)	3.50†	5–10%
(A&D + Neuras) : Patrol	2.51†	10–20%
Patrol (1) : Patrol (2)	6.38	5–10%
Patrol Sch : Patrol Non-Sch	5.22	10–20%

* 2 d.f., i.e., 2 higher categories combined to make "11–17".

† 1 d.f., i.e., "≧14" or "not ≧14".

Among the Neurotic groups there again appears to be a schism, in that the Anxiety and Depression group and the Neurasthenics tend to be somewhat worse than the other Neurotics; in the Anxiety and Depression group this is because of the depressive factor, and in the Neurasthenics it is because of the depressive-like sluggishness. These two groups show a trend to be worse than the other Neurotics and the Patrol.

The Patrol breakdown indicates two important findings. First, the Borderline-Adjusted Patrol shows a tendency to be worse than the Well-Adjusted Patrol; this indicates that poor adjustment, even though still within the normal range, may nevertheless mildly impair Block Design efficiency. Second, the Schizoid Patrol shows a tendency to be better than the Non-Schizoid Patrol; the Schizoid Patrol has 50% of its cases with weighted scores of 14 or more, and the Non-Schizoid Patrol has only 24%. It appears then that Schizoid trends, even within the normal range, may sharpen efficiency on Block Design, and result in a pattern similar to the Schizophrenic.

We conclude that (a) extreme low weighted scores are most frequent in the Depressive Psychotics. (b) Increasing severity of depression results in an increasing drop on Block Design. (c) On Block Design, as on Object Assembly, the Schizophrenics do not show the usual tendency toward extreme impairment, and even contribute a large share of the high weighted scores. (d) Among the Neurotic groups, depressive trends and neurasthenic sluggishness impair Block Design. (e) Within the normal range, precarious adjustment impairs efficiency, and schizoid trends—as in the Schizophrenics—tend to increase efficiency.

9. Special Comparison of Block Design and Picture Completion. Inasmuch as Block Design appears to be the most sturdy of the Performance subtests and Picture Completion the most vulnerable, it was felt that an investigation of the relationship between the scores on these two subtests in the various clinical groups might contribute toward facilitating differential diagnosis. It will be remembered that on Picture Completion, which we described as a test of visual concentration, Schizophrenics were characterized by extreme impairment; on Block Design their performance is characteristically well-retained. One would therefore expect a significant tendency in the Schizophrenics to have Block Design scores well above Picture Completion scores; one would expect this to be especially true of the Deteriorated Unclassified Schizophrenics, who showed such a striking impairment of visual concentration on Picture Completion.

Table 56 presents the analysis of the distributions of differences obtained by subtracting the Picture Completion scores from the Block Design scores. It is of special interest to examine the two extreme ranges in this Table. In the column representing the percentage of cases having Block Design scores 4 or more weighted score units above Picture Completion scores, we find 86% of the Deteriorated Unclassified Schizophrenics, which far exceeds all other groups; the Acute and Chronic Schizophrenics have 27% in this range, or about twice as much as the Depressives, Neurotics, or Patrol. We see then that this scatter relationship is characteristic for the Schizophrenics, particularly for some Deteriorated Schizophrenics.

At the opposite extreme—the percentage of cases having Block Design scores more than 1 unit below Picture Completion scores—we find none of the Deteriorated Schizophrenics, and mostly Normals. This is not surprising in the Normals, since they showed little impairment of either Picture Completion or Block Design, both remaining on a generally high level. Consequently, the 24% of the Patrol in this range is a representation of the normal amount of scatter to be expected on a generally high weighted score level. Table 56-B, presenting the differential significance of these distributions, bears out these considerations.

We conclude that it is most characteristic of the Schizophrenics, and especially of some Deteriorated Schizophrenics, to have Block Design scores very much above Picture Completion scores. This may serve as a special diagnostic scatter pattern of Schizophrenia.

TABLE 56-A.—*Distribution of Cases into 4 Ranges of Difference between the Scores on Block Design and Picture Completion*

(B.D. − P.C.)

Group	No. of Cases	Percentage of Cases			
		≧+4	+3 to +2	+1 to −1	<−1
(P + U) Sch (A + Ch)	51	27	22	43	8
U Sch D	7	86	—	14	—
Depr.	31	16	10	58	16
Neurotics	59	15	29	44	12
Patrol	54	13	22	41	24

TABLE 56-B.—*Differential Significance of Distribution of Cases*

Groups Compared	Chi^2	Significance
(P + U) Sch (A + Ch) : Depr.	4.61*	2–5%
U Sch D : Depr.	7.50†	<1%
(P + U) Sch (A + Ch) : Neurotics	2.62**	20–30%
U Sch D : Neurotics	13.90†	<<1%
(P + U) Sch (A + Ch) : Patrol	7.14**	2–5%
U Sch D : Patrol	15.46†	<<1%

* A dichotomy was tested here, i.e., "≧+2", "<+2".

† A dichotomy was tested here, i.e., "≧+4", "<+4".

** A trichotomy was tested here, i.e., "≧+4", "+3 to −1", and "<−1".

10. General Diagnostic Conclusions:

(a) Depression is the most potent factor making for impairment of efficiency on the Block Design subtest. All the Depressives, and those Neurotic groups showing significant evidences of depression or sluggishness, show great impairment of Block Design score below the Vocabulary level; and the Psychotic Depressives even show a drop of Block Design score below the extremely impaired Performance Mean. The extent of impairment roughly parallels the depth of depression.

(b) It is expected that the Block Design score of the Schizophrenics should not show any significant impairment from their Vocabulary level, and should be above their Performance Mean. In some

Schizophrenics, however, psychotic disorientation and confusion may cause extreme impairment on this visual-motor subtest. The relatively superior efficiency found in most Schizophrenics occurs not only in the full blown cases, but also in the Preschizophrenics and even in the Schizoid Normals.

(c) The sharp contrast between the Depressives on the one hand, and the Schizophrenics on the other, is crucial for differential diagnosis on the basis of scatter patterns: extreme impairment is characteristic for the Depressives, and striking retention of efficiency for the Schizophrenics.

(d) Weighted scores of 7 or less are extremely rare in Normals or in Non-Depressed Neurotics; this attests to the great stability of Block Design when depressive trends or psychotic confusion are absent.

(e) Within the normal range, precarious adjustment tends to impair, to some extent, efficiency on Block Design. However, low weighted scores should not be expected in any case.

Q. DIGIT SYMBOL

1. Introduction. The Digit Symbol subtest presents the subject with a sample line of 9 simple symbols, each printed below a number from 1 to 9 (see Figure 18); also given are 67 empty squares, each under one of these numbers in a random sequence. The test requires that the subject write, in the empty square below each number, the symbol associated with that number in the sample line.

The symbols are all familiar to the people of our civilization. They are however of several kinds: No. 1, No. 3, No. 7, and No. 9 are not habituated letters; No. 4 and No. 5 are strongly so habituated; No. 2, No. 6, and No. 8 are to some extent so habituated.

The Digit Symbol subtest implies following a visually-presented sample, and motor reproduction of the symbols; thus, it is considered a test of visual-motor coordination. According to Special Table 3, it ranks with the other two subtests of visual-motor coordination in respect to average score and standard deviation for our population.

The subject is allowed 90 seconds for work, and each symbol correctly copied is credited with one raw score unit. Correct copying implies that the symbol be drawn recognizably. The writing of a regular N instead of a reversed N merits a half raw-score unit. The highest weighted score obtainable is 16, which marks the second of the two systematic deficiencies of Wechsler's weighted score scale.

2. Visual-Motor Coordination in the Digit Symbol Subtest. The performance on Digit Symbol implies visual activity, motor activity, and a learning process.

The motor activity is of two kinds: first, the head and eye movements used in falling back upon the samples; second, the writing and drawing movements used in the reproduction of the symbols.

The learning process is always abortive, because of the non-sense connection between digit and symbol. Even if learning is stressed by the subject, the performance usually remains of an "attention" character; that is, it exists—as in Digit Span—as a "momentary noting" rather than being integrated with the interests and general frame of reference of the individual. This "learning" itself may be of three kinds. First, it may imply, "What symbol goes with this digit?" Second, it may be of a more spatial-motor type and imply, "Whereabouts on the sample line is the digit whose symbol I must look up, and whereabouts in the line of empty squares do I have to return to go on working?" The latter type of "learning" is really a structuralization of the motor task under visual guidance. It frequently replaces the first type of learning, since very efficient people will refrain from any effort to remember which symbol goes with which digit, and rather organize well for an efficient copying-job by learning merely the spatial position of the material to be copied. A very efficient variation of this method, involving considerable concentration, consists of not falling back systematically upon the samples, but rather using the nearest identical copied symbol as a sample. The third kind of learning is present in both of the first two, and has only a slight learning character; it involves the efficient writing of the nine symbols which are, in great part, habituated anyway.

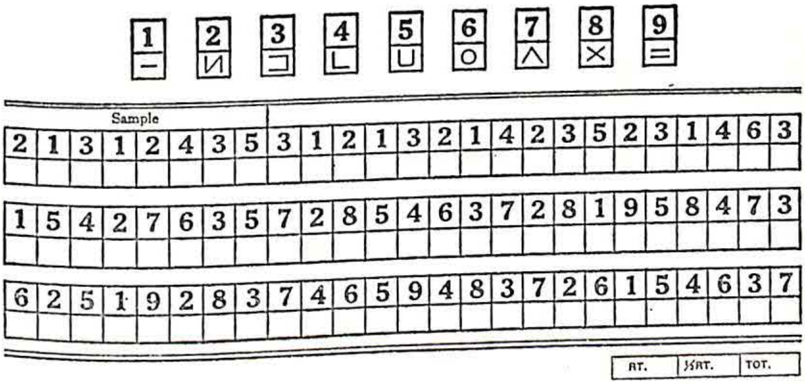


FIG. 18.—DIGIT SYMBOL TEST

The visual organizing function plays two different rôles: first, as the channel of learning and remembering the digits and associated symbols;[103]

---

[103] The verbal-motor function may also become the channel of a type of learning seen when the patient mutters to himself while working. This type is, however, error-producing; verbalization of symbols often changes them to letters.

second, as a guide in both the spatial-motor learning and the executive drawing and writing actions.

The Digit Symbol subtest is generally, and with considerable justification, regarded as a test of "psychomotor speed". In point of fact, speed retardation shows up more clearly on this subtest than on any other, with perhaps the exception of Block Design. But psychomotor speed is not a "function" in the sense in which "function" is used in these pages. Psychomotor speed appears rather as a complex effect of a variety of interacting functions, an expression of a relatively undisturbed working of the organism. However, it may remain very good in strongly habituated tasks—as seen in stenographers—or in some chronic and deteriorative cases where the disturbing acute storms of psychosis have subsided and automatism prevails.

The visual-motor coordination in this subtest is expressed in the tuning together of the visual percept (or memory) of the symbol and digit, the spatial-visual and spatial-motor orientation, and the executive half-habituated action of drawing. It is small wonder that such a delicate interaction is easily disturbed from any side.

First of all, anxious hesitancy and obsessive doubt impair the stability of visual organization and the percept of what is to be looked for, and where. Meanwhile, motor action becomes hesitant; and while, if the percept had been quickly acted upon, it would have served its purpose, in the course of hesitant movements preparatory to action the visual guiding percept all but disintegrates, and time-consuming checks and rechecks follow. At times we shall see subjects, especially those whose anxiety and attention disturbance are considerable, compensate for a labile visual organization by jotting down the symbols with a jerky rapidity, in order not to lose them. Thus not only visual and motor efficiencies tune together, but also their inefficiencies.

Visual and motor disorganization can be profound enough to so distort the symbols that it becomes difficult to decide whether the disorganization is essentially visual or affects the total coordination whereby motor action is guided by visual organization.

Some meticulous people, in spite of the obvious stress on speed, proceed very slowly and draw the symbols with painstaking exactitude. The instructions—uniform for every subject—are apparently understood by these people as requiring exact rather than extensive copying. The result is a low score of "psychomotor speed", which should not be interpreted as a "depressive" indication. Otherwise, a general extreme slowness without hesitation, doubt, meticulousness, or distortion of the symbols, is rarely seen, and then only in depressives. Such essential retardation of psychomotor speed is a part of the generalized depressive retardation, and as yet we have no testing data which would contribute to its explanation.

3. Administration. A few points of administration not enlarged upon by Wechsler should be taken up here.

(a) We found it useful to insert into the standard instruction: "Take each in order as it comes." Those subjects who are inclined inadvertently to skip a space here and there or to shift from one line to another, or to fill in first the squares underneath one given digit, will do so in spite of the added instruction; and the examiner will know that this is not a result of misunderstanding the instruction.

(b) We found it useful to inquire into any repeated peculiar writing of a symbol; such peculiarities are sometimes due to a schizophrenic misinterpretation of the symbol.

(c) Whenever a subject started erasing we in part gave "time out"—without crediting the symbol, if it was originally unacceptable—and in part discouraged such corrections. Our attitude both here and in (a) was conditioned by our desire to have a test performance as little distorted as possible by disturbances other than those of visual-motor coordination.

(d) It is recommended that the examiner note and record changes in speed of performance. Particularly, general trends of increasing or decreasing speed, as measures of both readiness of adjustment to a task and fatigability, as well as wavering attention deserve consideration. Inexperienced examiners and those who wish to use the material for research are recommended to time the parts of performance in groups of five, or at least of ten.[104]

4. Vocabulary Scatter and Mean Scatter: "t"-Test.

The average Vocabulary Scatter of the Digit Symbol for all our groups is represented in Graph 3 of Special Figure 1. The most striking trend it indicates is the severe impairment in the Depressive Psychotics, the somewhat milder impairment in the Neurotic Depressives. As on most of the other Performance subtests, increasing severity of depression results in increasing severity of impairment.

No consistent trend in the Schizophrenic groups is indicated. The Deteriorated Unclassified Schizophrenics, who clinically show extreme distractability, flightiness and inability to stick to a routine task, are the worst of all our Schizophrenics, and comparable to the Depressive Psychotics; they are followed by the Acute Paranoid Schizophrenics; these are followed by the remaining Schizophrenic groups, the Preschizophrenics, and the Obsessive-Compulsives, who again appear to be following the Schizophrenic pattern. The Anxiety and Depression group shows an impairment equivalent to that of the Neurotic Depressives, whose pattern they have consistently followed.

---

[104] The significance of such timing will be discussed in connection with the Babcock Test. See pages 332, 377.

The remaining Neurotic groups and the Normals show either minimal scatter below Vocabulary or very slight positive scatter.

The Digit Symbol column of Special Table 1 shows that all the Depressive groups have significant scatter below the Vocabulary level. One might well wonder why the −4.8 average Vocabulary Scatter of the Psychotic Depressive group is significant only on the 2% level. The explanation is that one Psychotic Depressive case, characterized mainly by extreme agitation with no evidence of retardation, achieved a quite high score on Digit Symbol; but the overwhelming trend in the Psychotic Depressive group is to have extreme impairment.

It is interesting to note that in the Schizophrenics the average scatter is lowest in the Chronic groups. We have already seen on other Performance subtests how chronicity may make for better efficiency than either acuteness or deterioration; and this appears to be the case on Digit Symbol. The Acute and Chronic Paranoid Schizophrenics appear to be harder hit than the equivalent Unclassified Schizophrenics; we have already seen this to be true on Picture Arrangement and Picture Completion, but not on Object Assembly or Block Design. The finding—discussed in the section on Major Scatter Patterns—that the Paranoid Schizophrenics have a trend toward greater impairment than the Unclassified Schizophrenics on the Performance subtests taken together now becomes clear: this drop of the Performance level applies not to all the Performance subtests, but rather to the two visual subtests and to this last subtest of visual-motor speed. It also becomes clear that this greater impairment among the Paranoid Schizophrenics does not result in a scatter pattern different from that of the Unclassified Schizophrenics, but rather in an exaggeration of the same pattern; both the Unclassified and Paranoid Schizophrenics have in general a well-retained Block Design and Object Assembly efficiency.

Among the Neurotics, only the Anxiety and Depression group and the Obsessive-Compulsives show a significant drop below the Vocabulary level. A drop equivalent to that of the Obsessive-Compulsives is found in the Over-Ideational Preschizophrenics, a group which, as already stressed, is kindred to the Obsessive-Compulsives in many ways.

Though the average drop below Vocabulary in the Well-Adjusted Patrol is relatively small, it is nevertheless consistent from case to case, as indicated by its significance below the 1% level. We have already seen on other Performance subtests that the Patrol has a mild but consistent negative Vocabulary Scatter. In other words, it appears to be a rather consistent trend among Normals—even such as the Patrol, whose job requires complex visual and visual-motor activity—to have their Performance scores a bit below the Vocabulary level.

This trend in the Normals is seen even clearer in Special Table 2, which gives the average scatter of Digit Symbol from the Performance Mean, and its significance, for all our groups. We see that the Well-Adjusted Patrol, which had a significant though mild drop below Vocabulary, has absolutely no deviation from the Performance Mean; and the Borderline-Adjusted Patrol even shows a significant superiority on Digit Symbol to the Performance Mean. Only on Picture Arrangement, therefore, have we seen any tendency for special impairment in the Patrol. It appears that their Performance scores are simply not as good as their Vocabulary scores.

Considering the Digit Symbol column in Special Table 2 as a whole, the most striking thing is that, aside from the Borderline-Adjusted Patrol, there are no groups with a really significant deviation one way or the other from the Performance Mean. Here the column of significances is strikingly empty, compared to the columns for the other Performance subtests. The implication of this is that the Digit Symbol score, more than any other Performance subtest score, is the most representative of the hypothetical Performance Mean. Only two trends for special impairment approaching significance are evident. The first is found in the Deteriorated Unclassified Schizophrenics, where it is a consequence of the fact that some of the Performance subtests remain unimpaired in this group; these pull up the Performance Mean, making the impairment on Digit Symbol significant. The second is found in the Involutional Depressive group, and may be taken to indicate that in some of these cases visual-motor speed will be especially hard hit in comparison to other Performance subtest scores, even though the others also show considerable impairment. One might summarize briefly the total Performance scatter pattern of the Depressives thus: although all the subtests show considerable impairment, the two visual Performance subtests—Picture Arrangement and Picture Completion—may be somewhat less impaired, while any or all of the three visual-motor tests may show special impairment.

We conclude that (a) increasing severity of depression results in increasing impairment of visual-motor speed. (b) The Deteriorated Unclassified Schizophrenics, because of their distractability and inability for sustained and rapid concentration, also show extreme impairment of visual-motor speed. (c) Even the other Schizophrenic groups show some such impairment, although it is more clear-cut in the Paranoid Schizophrenics than in the Unclassified Schizophrenics. (d) The intellectualizing Obsessive-Compulsives and Preschizophrenics appear to be relatively inefficient where visual-motor speed is required. (e) Normals, though they may show a mild drop of Digit Symbol below Vocabulary, show no real impairment of visual-motor speed, especially if the Digit Symbol score is compared to the Performance Mean. (f) Therefore, depression again appears to be the most potent common factor making for impairment of visual-motor speed.

5. *Vocabulary Scatter: Chi^2 Test.*

Table 57-A presents the percentage distribution of cases into 6 ranges of scatter. This detailed breakdown is presented, first, because of the great variability of this subtest, as seen in cases of a given group being represented in the extreme negative and positive ranges; and second, because it makes evident several trends. For example, 47% of the Depressive Psychotics—or nearly half—have a Digit Symbol score 6 or more units below the Vocabulary score; in contrast, the Depressive Neurotics have no cases in this range. The only group as poor as the Depressive Psychotics is the Deteriorated Unclassified Schizophrenic group, with 43%. The other Schizophrenic groups have less than 20% in this range, and the Neurotics and Normals have practically no cases in it.

Table 57-B, presenting the differential significance of these distributions, in general supports the finding that impairment is greatest in the Depressive Psychotics and the Deteriorated Unclassified Schizophrenics; that the other Schizophrenic groups are also impaired, but less; that the Depressive Neurotic groups, though impaired, are significantly superior to the Depressive Psychotics; that the Neurotics show only a mild trend toward impairment; and that the Patrol is the most efficient of all our groups.

TABLE 57-A.—VOCABULARY SCATTER OF DIGIT SYMBOL. *Percentage of Cases in Ranges of Scatter*

Group	No. of Cases	Percentage of Cases					
		≧4	+3 to +2	+1 to 0	−1 to −3	−4 to −5	≦−6
(P + U) Sch	63	2	11	16	33	19	19
U Sch (A + Ch)	30	3	10	17	40	17	13
U Sch D	7	—	14	—	29	14	43
P Sch	26	—	12	19	27	23	19
DP + DI	15	—	7	7	13	27	47
DSN + DN	16	—	—	6	56	38	—
Depr	31	—	3	6	35	32	23
Neurotics	59	5	7	27	39	15	7
Patrol	54	2	20	22	43	9	4
Patrol Anx	36	3	28	19	44	6	—
Patrol Non Anx	18	—	6	28	39	17	11
Patrol Depr	16	6	19	12	44	19	—
Patrol Non Depr	38	—	21	26	42	5	5
Patrol Sch	12	—	8	25	58	8	—
Patrol Non Sch	42	2	24	21	38	10	5

TABLE 57-B.—*Differential Significance of Distribution of Cases*

Groups Compared	Chi² (d.f. = 2)*	Significance
(P + U) Sch : Depressives	3.60	10–20%
(P + U) Sch : Neurotics	4.11	10–20%
(P + U) Sch : Patrol	9.73	<1%
U Sch (A + Ch) : U Sch D	.61**	30–50%
P Sch : U Sch D	.64**	30–50%
Depressives : Neurotics	10.46	<1%
Depressives : Patrol	18.44	<<1%
(DP + DI) : (DSN + DN)	7.16**	<1%
Neurotics : Patrol	3.12	20–30%
Neurotics − (O-C + A&D) : A&D	2.53	20–30%
Neurotics − (O-C + A&D) : O-C	4.35	10–20%
Patrol Depr : Patrol Non Depr	.97	50–70%
Patrol Anx : Patrol Non Anx	7.09	2–5%
Patrol Sch : Patrol Non Sch	2.47	30%

* A trichotomy was tested: i.e., "≧+2", "+1 to −3", "<−3".

** A special dichotomy was tested, i.e., "≦−6", ">−6".

It is of interest to examine the results concerning the Patrol breakdown. The only significant difference is between the Anxious and the Non-Anxious Normals, with the Anxious Normals doing significantly better; this again, as on Picture Completion, indicates the possibility that anxious but still-adjusted individuals can apply the pressure of concentration which, though perhaps excessive, results in a superior achievement. The absence of differentiation between the Depressive and Non-Depressive Normals indicates that, within the normal range, mild mood swings toward depression do not impair the Digit Symbol score—that is, the visual-motor speed.

We conclude that the findings of the analysis of Vocabulary Scatter, in terms of percentage distribution of cases into ranges of scatter, are consistent with those advanced above concerning average Vocabulary Scatter.

TABLE 58-A.—Modified Mean Scatter of Digit Symbol. *Percentage of Cases in Ranges of Scatter*

Group	No. of Cases	Percentage of Cases			
		$\leqq -2$	> -2 to < 0	0 to $< +2$	$> +2$
U Sch (A + Ch)	30	33	10	30	27
P Sch	26	27	27	23	23
Depressives	31	26	29	29	16
Neurotics	59	17	36	19	29
Patrol	54	17	26	24	33

6. *Modified Mean Scatter: Chi*^{2} *Test.*

Table 58 shows that there are almost no significant differences between the major clinical and control groups. This same finding was true for Special Table 2, where no significant average scatter below the Performance Mean was found for any group. The same trends that were found in regard to Vocabulary Scatter are, to a very mild extent, expressed in this table.

We conclude that comparison of the Digit Symbol score with the other Performance subtest scores taken together is relatively ineffective for diagnostic purposes. The important comparison is that of Digit Symbol with Vocabulary; as we have seen, a Digit Symbol score well below Vocabulary is most indicative of depressive trends retarding visual-motor speed, or of Schizophrenic encroachment upon concentration. However, differentiation between the Depressive impairment and the Schizophrenic impairment can be made by means of comparison with the other Performance subtest scores; in the Depressives these will also be low, while in the Schizophrenics Block Design, and in many cases Object Assembly, will be quite well-retained.

7. *Analysis of the Extreme Weighted Scores of the Digit Symbol Subtest.*

Let us now survey the distribution of weighted scores, in order to determine on what level the discussed scatter patterns occur. Special Figure 2 presents the distribution of cases with weighted scores of less than 6 and shows 16 such cases in our entire population. 9 of these cases, or more than 50%, are contributed by the Psychotic and Severe Neurotic Depressives, who constitute only about 9% of our entire population. We have here striking evidence of the close relation between impairment on Digit Symbol and severity of depressive trends. 3 cases are contributed by the Deteriorated Unclassified Schizophrenics; in other words, about 3% of the entire population contributes 20%, demonstrating how the extremely impaired concentration may also seriously impair Digit Symbol efficiency.

Special Figure 3, representing the high weighted scores of 15 or more, shows 16 such cases. Of these, 5 are Neurotics, 4 are Preschizophrenics, and 3 are Paranoid Conditions. Furthermore, 3 Chronic Unclassified Schizophrenics lie in this range, which seems out of keeping with the general trend toward impairment described for the Schizophrenics. In our experience, however, we have frequently found it characteristic of a good number of Chronic Schizophrenics to have excellent Digit Symbol scores, no matter how much impairment they show on the other Performance subtests. These cases have generally been bland and anxiety-free, and able to take Digit Symbol in their stride, although the psychotic disorganization of thought processes and visual organization impaired many of the other subtests.

TABLE 58-B.—*Differential Significance of Distribution of Cases*

Groups Compared	Chi² (d.f. = 3)	Significance
U Sch (A + Ch) : U Sch D	2.02*	10–20%
U Sch (A + Ch) : P Sch	2.84	30–50%
P Sch : U Sch D	2.99*	5–10%
U Sch (A + Ch) : Depressives	5.08	10–20%
U Sch D : Depressives	3.45*	5–10%
U Sch (A + Ch) : Neurotics	8.51	2–5%
U Sch D : Neurotics	7.70*	<1%
P Sch : Neurotics	1.69	50–70%
U Sch (A + Ch) : Patrol	5.43	10–20%
U Sch D : Patrol	7.64*	<1%
P Sch : Patrol	1.56	50–70%
Depressives : Neurotics	3.38	30–50%
Depressives : Patrol	3.24	30–50%
Neurotics : Patrol	1.62	50–70%

* Because of the small and concentrated distribution in the U Sch D group, for it against other groups a dichotomy was tested, i.e., "≦−2", ">−2".

Table 59-A presents the percentage distribution of cases falling into three ranges of weighted scores. We see that the Depressive Psychotics, in contrast to all other groups with one exception, have 80% of their cases with weighted scores of 7 or less. The exception is the Deteriorated Unclassified Schizophrenics, who have 86% of their cases in this range. The only other group which approaches this range is the

Severe Neurotic Depressive group with 56%. The greatest representation in the high weighted score range occurs in the Acute and Chronic Unclassified Schizophrenics, the Neurotics, and the Normals. The Paranoid Schizophrenics, following their consistent trend toward impairment of Digit Symbol, have no cases with high weighted scores.

Table 59-B, presenting the differential significance of these distributions, shows that in the Depressives the drop of the Digit Symbol weighted score increases with the severity of depression; that the Deteriorated Unclassified Schizophrenics are significantly worse than all the other Schizophrenic groups; and that, in general, the Neurotics and the Patrol are significantly better than all of the other clinical groups.

TABLE 59-A.—*Distribution of Weighted Scores on Digit Symbol*

Group	No. of Cases	Percentages		
		0–7	8–13	14–17
U Sch (A + Ch)	30	23	60	17
P Sch	26	23	77	—
DP + DI	15	80	13	7
Neurotics	59	10	73	17
Patrol	54	2	83	15
Patrol Depr	16	—	75	25
Patrol Non-Depr	38	3	87	11
Patrol Sch	12	—	92	8
Patrol Non-Sch	42	2	81	17
Patrol Anx	36	—	81	19
Patrol Non-Anx	18	6	89	6

In the Patrol breakdown, only the differentiation between Anxious and Non-Anxious Normals yields a trend toward a difference in distribution; the Anxious Patrol tends to have more high weighted scores than the Non-Anxious Patrol. We have already commented upon this superiority of the Anxious Normals, attributing it to the increased pressure which they put upon themselves to hurry and finish as many as possible.

We conclude that (a) low weighted scores are most frequent in Depressive Psychotics, as a consequence of their retardation, and in the Deteriorated Unclassified Schizophrenics, as a consequence of their distractability and loss of power for sustained concentration. (b) High weighted scores are to be expected mainly in the Preschizophrenics, the Neurotics, and the Normals, especially the Anxious Normals. (c) Although the predominant trend in Schizophrenic groups is toward some impairment of Digit Symbol, there are nevertheless some bland Unclassified Schizophrenics who do exceedingly well on it despite marked impairment on some other subtests.

TABLE 59-B.—*Differential Significance of Distribution of Cases*

Groups Compared	Chi^2 (d.f. = 2)	Significance
U Sch (A + Ch) : U Sch D	9.49	<1%
P Sch : U Sch D	6.84*	<1%
U Sch (A + Ch) : P Sch	4.87	5–10%
U Sch (A + Ch) : (DP + DI)	13.43	<<1%
P Sch : (DP + DI)	15.55	<<1%
U Sch (A + Ch) : Neurotics	2.83	20–30%
P Sch : Neurotics	6.60	2–5%
U Sch (A + Ch) : Patrol	10.55	<1%
P Sch : Patrol	12.80	<<1%
U Sch D : Neurotics	23.46	<<<1%
U Sch D : Patrol	43.11	<<<1%
(DP + DI) : DSN	1.60	30–50%
(DP + DI) : DN	8.99	1%
DSN : DN	2.89	20–30%
DSN : Neurotics	15.09	<<1%
DSN : Patrol	24.63	<<<1%
Neurotics : Patrol	3.49	10–20%
Patrol Depr : Patrol Non-Depr	2.14	30–50%
Patrol Anx : Patrol Non-Anx	4.05	10–20%
Patrol Sch : Patrol Non-Sch	.85	50–70%

* The dichotomy "0–7" : ">7" was tested here.

8. General Diagnostic Conclusions:

(a) Aside from Schizophrenic deterioration, impaired psychomotor speed as reflected in the Digit Symbol score is most directly related to the presence of depressive trends. Increasing severity of depression results in increasing impairment of visual-motor speed; and therefore, diagnostically, one may estimate the severity of the depression from the impairment of the Digit Symbol score, with reference to both the Vocabulary level and the weighted score itself.

(b) Other Schizophrenic groups, besides the Unclassified Deteriorated, tend to show some impairment on the Digit Symbol subtest, probably reflecting their impairment of concentration; but some bland Schizophrenics may do exceedingly well on this subtest.

(c) Weighted scores of 7 or less are practically absent in Normals, even those inclined toward depressive mood swings. This gives emphasis to the point that a relatively poor performance on Digit Symbol is generally a sign of pathological depression or, less frequently, of some Schizophrenic disturbance.

R. THE SCATTER PATTERN OF OUR CLINICAL AND CONTROL GROUPS

In introducing the analysis of our findings on the Bellevue Scale, we stated that in our clinical experience the scatter of the subtest scores on an intelligence test is not random but clinically meaningful, and usable for diagnostic purposes. We outlined there a view of intelligence, in the framework of which the selective impairment of certain subtests making for diagnostically meaningful scatter patterns can be best understood. We followed these summary statements of clinical experiences and theoretical assumptions by demonstrating, in the section on "Major Scatter Patterns", some general differentiating characteristics of very crude scatter measures; and we then analyzed the scatter of each subtest of the Bellevue Scale.

Having reached the end of these analyses, we are obliged to ask ourselves, What have we found? The existence of clinically-characteristic scatter patterns is not demonstrated merely by finding quantitative differences in over-all impairment on the subtests more or less proportionate to the extent of maladjustment; but rather by the selective impairment of single subtests or subtest groups in specific clinical and control groups. In the analyses of this chapter, we have found such selective impairments. Here we shall attempt to bring these findings into focus.

In Figure 19 the scattergrams of every clinical group are represented. The principle of these scattergrams is identical with the individual scattergram represented in Figure 1; but there are two essential differences between the individual and the group scattergrams. The individual scattergrams represent weighted scores of the individual. The group scattergrams represent the average Vocabulary Scatter of all the individuals in the group on each of the subtests, the Vocabulary level being represented by the vertical axes of these group scattergrams. Figure 19 consists of ten graphs. Each graph contains several graphlines, representing the scattergram of the separate subgroups of a major clinical group.

Before deciding to center the summarizing discussion on these graphs of the average Vocabulary Scatter, we attempted to find in our material individual scattergrams for each clinical group which would contain all the features we found characteristic of that group. No such individual scattergrams were found, as the reader may see by going over the tables in Appendix No. II which present all the weighted scores of all cases used in this study. We must ask ourselves whether the absence in our material of such typical cases implies that these average Vocabulary scattergrams, and all our statistical analyses, are statistical artifacts of no use in clinical practice. The answer is definitely in the negative: these findings are not statistical artifacts, but rather expressions of statistically idealized trends. These trends are present, and the reader may convince himself that, in the majority of the cases of each group, the weighted scores on each subtest have some of the characteristics represented by the average Vocabulary scattergram of the group. Some of the cases have more, some have less, and some have none. It is with the purpose of driving this point home that we present all the weighted score data in the Appendix. In anticipation of these findings, we advanced some rationale for the nature of intelligence and for the nature of each subtest. It has to be kept in mind that psychological functions and their impairment are subject to many influences specific to the individual and to the situation in which they are tested; and accordingly the general idealized patterns, like those of nosological categories found in textbooks of psychiatry, are subject to individual variation. It is the experience of the present authors that the scattergram of the Bellevue Scale is definitely diagnostic in 30–40% of the cases; in another 30–40% the scattergram, though by no means conclusive, offers indications as to the diagnostic direction; in the rest of the cases the scattergram is altogether inconclusive.

Here a new question arises. Is it worthwhile to work with a diagnostic test where the examiner must keep in mind general scatter patterns, specific subtest scatter distributions, results of item-analysis, and many cumbersome instructions concerning administration, only to obtain diagnoses in 30–40% of the cases, and diagnostic hints in another 30–40%? Without attempting to answer this question directly, the following considerations are offered:

1. In clinical testing work as practiced at present, some kind of an intelligence test is always given. The results obtained in analysis of the Bellevue Scale suggest that, in using it, one uses a two-purpose tool instead of a one-purpose tool. That is to say, in addition to the intelligence measures one can obtain an estimate of adjustment also.

2. The reader shall see later that the efficiency of other diagnostic procedures, as expressed in the percentage of cases in which full diagnoses or diagnostic hints are given by them, is not far superior to the percentages stated for the Bellevue Scale.

3. Where other clinical or testing data are at the disposal of the ex-

aminer, both the overlapping and the mutual exclusiveness of diagnostic indications will make the Bellevue Scatter more valuable than it appears at first sight.

4. Granted that in the beginning the examiner finds the procedure of using item and scatter analysis very cumbersome; still, after some experience neither the recording nor the analysis requires any more effort than the usual administration of the test. After some experience, the significant parts of the Bellevue Scale performance stand out against the routine stereotyped parts so sharply that the evaluation becomes, in a sense, automatic.

5. The examiner must keep in mind that the Bellevue Scale subtests do not tap all the functions that can be tapped by intelligence testing. It is hoped that systematic, wide-spread work in scatter diagnosis will encourage exploration of scatter of tests tapping other functions than those tapped by the Bellevue subtests, and will lead to a more intimate knowledge of selective impairments of intellectual functioning and finally to the construction of intelligence tests specifically for the purpose of diagnostic scatter analysis, with the yield of I.Q. a matter-of-course side-issue.

In the following pages we shall present the average Vocabulary scattergrams—that is, the specific scatter patterns—of each of our research groups. We shall present first the specific scatter patterns characteristic of each group, and as we progress through the groups we shall deal progressively more and more with the features that differentiate group from group. Finally, we shall offer an analysis of the high and low weighted score distribution in our total population.

1. *The Schizophrenic Groups.* Graph 1 of Figure 19 presents the average Vocabulary scattergram for the Acute, Chronic, and Deteriorated Unclassified Schizophrenics.

The first striking feature of the Acute Unclassified Schizophrenics is that the subtest scores, with the exception of Information, are all below the Vocabulary level, indicating an impairment of efficiency on practically all the subtests. Information, as we have seen, is generally as well-retained as Vocabulary, even in some psychotic groups. This is especially substantiated by the fact that all three of these Schizophrenic groups, regardless of the stage of deterioration, have negligible Vocabulary scatter of their average Information scores.

Proceeding from the top of this scattergram downward, the following diagnostic pattern for the Acute Unclassified Schizophrenics emerges: Comprehension shows some impairment; Information is well-retained; the impairment of Digit Span is little, while that of Arithmetic is great (this relationship of these two scores we have called "out-of-pattern", since in nearly all of the other groups Digit Span is much more vulnerable than

Arithmetic); Similarities shows little impairment; Picture Arrangement and Picture Completion are greatly impaired; Block Design shows only mild impairment, while Object Assembly shows extreme impairment; Digit Symbol is impaired, but not so badly as the visual organization subtests. Thus, the characteristic scatter pattern of Acute Unclassified Schizophrenics is that on the verbal subtests they show impairment on Comprehension and especially on Arithmetic, while on the performance subtests they show greatest impairment on the two visual organization subtests, Picture Arrangement and Picture Completion, and on Object Assembly. The scores of the Chronic Unclassified Schizophrenics also are all, with the exception of Information, below the Vocabulary level; but these scores are not so poor as those of the Acute cases. This is especially true on the performance subtests. We have seen, in the individual subtest analyses, that frequently these Chronic cases do better than the Acute, and we attempted at various points to give some rationale for this finding. The hypotheses which we offered should be summarized here. The term "Acute" refers not merely to the recency of the onset of Schizophrenic symptoms, but also to the acute experiencing of the psychotic break with the recurrent turmoil, confusion, and general inefficiency. On the other hand, Chronic cases have "settled down with their psychosis", and show more or less blandness with reference to their delusions or bizarre behavior. This "settling down" we believe to be the essential factor in the superiority here of Chronic over Acute cases; it enables them to approach the tests in a more casual, unanxious manner, which is gen-

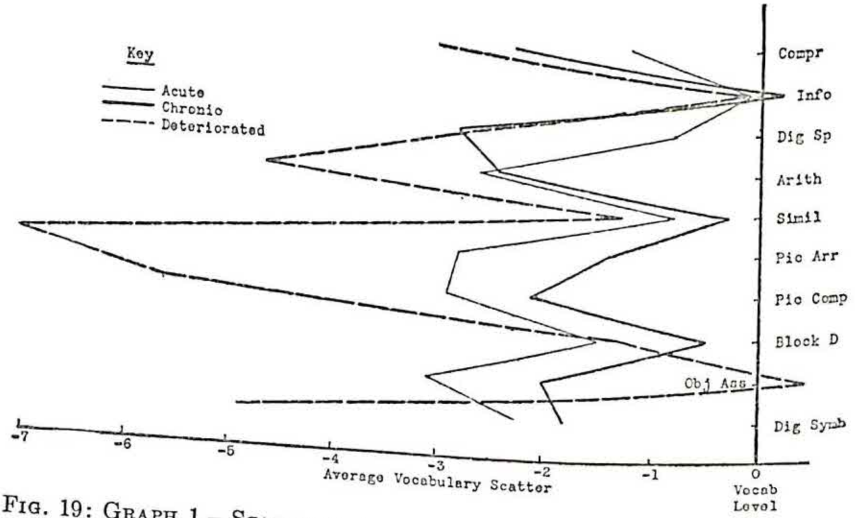


FIG. 19: GRAPH 1.—SCATTERGRAM OF THE UNCLASSIFIED SCHIZOPHRENICS Subtest Averages

erally advantageous for the achievements of the subject. The Chronic cases do worse than the Acute in two places only: first, their Comprehension achievement (or "judgment") is much more impaired, which is to be expected from the clinical fact that chronicity and deterioration in Schizophrenia lead to increasing derangement of everyday judgment; secondly, the Chronic cases do not follow the Acute cases' strong tendency toward the "out-of-pattern" relationship of Arithmetic and Digit Span, but have rather an extreme impairment of both. One might say, therefore, that the characteristic scatter pattern of the Chronic Unclassified Schizophrenics is similar to that of the Acute Unclassified Schizophrenics, but is not so impaired on the performance subtests and is more impaired on judgment and attention.

The Deteriorated Unclassified Schizophrenics show extreme impairment on almost all of the subtests. Comprehension and Digit Span are greatly impaired, Arithmetic impairment is even greater, and greatest of all is the impairment on Picture Arrangement, Picture Completion, and Digit Symbol. In striking contrast is the relatively efficient performance on Information, Object Assembly, and, to a lesser extent, Similarities and Block Design. In general, the scatter pattern of the Deteriorated group may serve as an exaggerated representation of that characteristic of Schizophrenic patients. Impairment of judgment (Comprehension), concentration (Arithmetic, Picture Completion, Digit Symbol) and planning ability and anticipation (Picture Arrangement) is, in varying degree, the outstanding feature of the scatter of all three Schizophrenic groups.

If we turn to the scatter of the three Paranoid Schizophrenic groups, in Graph 2 of Figure 19, we see that with certain distinct modifications, the same general pattern holds true as in the Unclassified groups. First, the impairment of Comprehension or judgment in the Paranoid Schizophrenics, although present, does not become significantly worse with increasing deterioration. This is a finding to be kept in mind when the question of diagnosis of Paranoid Schizophrenia arises: it is characteristic of Paranoid Schizophrenics that not even the Deteriorated cases suffer too great impairment of Comprehension. However, Information shows some impairment associated with Chronicity and Deterioration, which was not the case in the Unclassified Schizophrenics. This finding also may serve as a clue in the differential diagnosis of the Paranoids from other types of Schizophrenia.

The out-of-pattern relationship of Digit Span and Arithmetic appears more likely to occur in the Chronic and Deteriorated Paranoid Schizophrenics, whose average Vocabulary scatters on these two subtests are approximately equal; the Acute Paranoid Schizophrenics show a significantly greater impairment of Digit Span than of Arithmetic. There is a striking increase of impairment on Similarities associated with Chronicity and Deterioration in the Paranoid Schizophrenics, which may well serve as a reference point in estimating the extent of Chronicity and Deterioration; in the Acute Paranoid Schizophrenics Similarities is even slightly better than Vocabulary, which is by no means the case in the Acute Unclassified group. All three Paranoid groups show great impairment on Picture Arrangement, and the Deteriorated Paranoids especially so; while on Picture Completion the Deteriorated Paranoids show little impairment relative to the other two groups. All three groups do relatively well on Block Design, a feature which was noted also in the Unclassified Schizophrenics. The findings on Object Assembly correspond to those in the

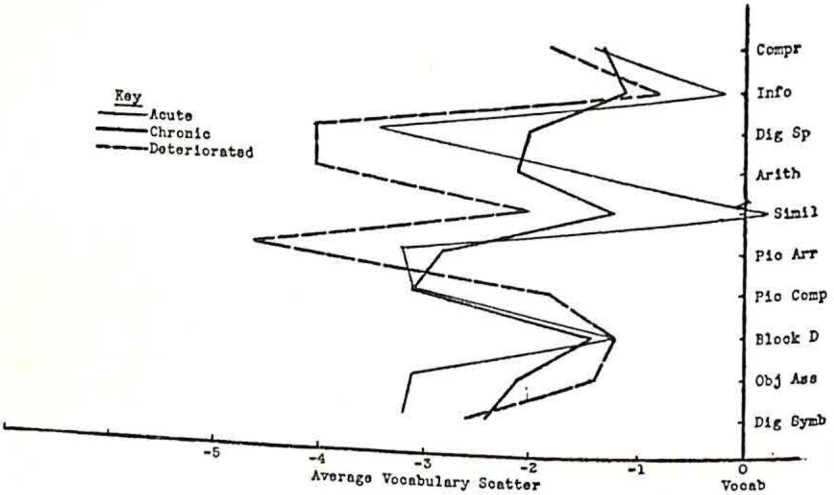


FIG. 19: GRAPH 2.—SCATTERGRAM OF THE PARANOID SCHIZOPHRENICS
Subtest Averages

Unclassified Schizophrenics: the Acute cases are the worst, the Chronic cases are the next worst, and the Deteriorated cases are the best. In connection with the Unclassified Schizophrenics we have already discussed the general rationale for the finding that Chronic Schizophrenics are frequently better than Acute Schizophrenics, and that in some cases—as on Object Assembly—the Deteriorated Schizophrenics are best. On Digit Symbol the great impairment of the Acute Paranoids is striking; we have taken it to represent, to some extent, the depressive coloring frequently found in Paranoid Schizophrenics.

One may characterize the Paranoid Schizophrenics, then, as roughly similar to the Unclassified Schizophrenics: judgment is mildly and equally impaired in all groups; concentration is progressively impaired with deterioration; planning ability and anticipation are very much impaired, especially in Deteriorated cases; and psychomotor speed may be also considerably impaired. Differential diagnosis of Acuteness, Chronicity, and Deterioration uses the following reference points: (1) the Acute cases characteristically show excellent retention of Similarities and good retention of Information, but show up as the worst group on Object Assembly and Digit Symbol; (2) the Chronic cases show a relative flattening out of the great scatter found in the Acute cases, and are differentiated from them by their impairment of efficiency on Information and Similarities; (3) the Deteriorated cases have the greatest impairment of judgment, attention and concentration, planning ability and anticipation, and in contrast to the Acute and Chronic cases tend to be relatively efficient on Object Assembly.

The scattergrams of both the Unclassified and Paranoid Schizophrenics show immediately that the greatest amount of scatter occurs in the Deteriorated groups, and that the next greatest amount of scatter occurs in the Acute groups; the Chronic groups, as previously pointed out, tend to be consistently but mildly impaired on all subtests.

The scattergram of the Simple Schizophrenics, in Graph 3 of Figure 19, is strikingly different from that of the other Schizophrenic groups, in that they have five of their ten subtest score averages above the Vocabulary level. This must not be taken to indicate a good performance on these subtests, because the Vocabulary score of this group is characteristically low. From the scattergram, it becomes apparent that their Vocabulary is somewhat poorer than their judgment and much poorer than their Information, and that they show more efficiency on the three subtests of visual-motor coordination than on Vocabulary. As in the other Schizophrenic groups, concentration (Arithmetic and Picture Completion), as well as planning ability and anticipation (Picture Arrangement), are so impaired that they drop even below the impaired Vocabulary level. Again as in the other Schizophrenic groups, the average impairment of Digit Span is less than that of Arithmetic, or is "out-of-pattern". In general, then, the scatter pattern of the Simple Schizophrenics may be described as one characterized by a low Vocabulary level, with even lower efficiency on the visual organization subtests, as well as on the tests of concentration and concept formation. The superiority of achievement of Simple Schizophrenics on Object Assembly parallels that found in the two Deteriorated Schizophrenic groups previously discussed, and is referable to the same bland, unintegrated but not acutely disturbed, approach to this subtest.

2. The Paranoid Conditions. The scattergram of the Paranoid Conditions group, in Graph 3 of Figure 19, is roughly congruent with that of the Schizophrenic—especially the Paranoid Schizophrenic—groups discussed.

Thus, we find first of all an impairment of Comprehension, with an excellent retention of Information and Similarities; and although both attention (Digit Span) and concentration (Arithmetic) are impaired, the latter is the more so, indicating the frequent presence of the "out-of-pattern" relationship in these Paranoid Conditions. Like the Schizophrenics also, they show up worst on the two visual organization subtests, indicating impairment of their planning ability and anticipation, as well as of their concentration; their Digit Symbol achievement is, however, much better than, and their Block Design somewhat worse than, that of the Acute Unclassified or Acute Paranoid Schizophrenics; their Object Assembly is as impaired as in the Acute Schizophrenics. One might therefore consider it difficult to differentiate a Paranoid Condition from an Acute Schizophrenia, and especially from an Acute Paranoid Schizophrenia, on the basis of their Scattergrams; and this is to a large extent true. However, the well retained achievements on Vocabulary, Information, and Similarities tend to be on a much higher weighted score level in the Paranoid Conditions than in the Schizophrenics; and if one turns to an analysis of misses on easy items, and to a qualitative analysis of them, it becomes apparent that the Schizophrenics do much worse in both respects. It is this excellent retention on the verbal subtests with the exception of Comprehension, and their otherwise Acute Schizophrenic-like scatter pattern, which is characteristic for the Paranoid Conditions.

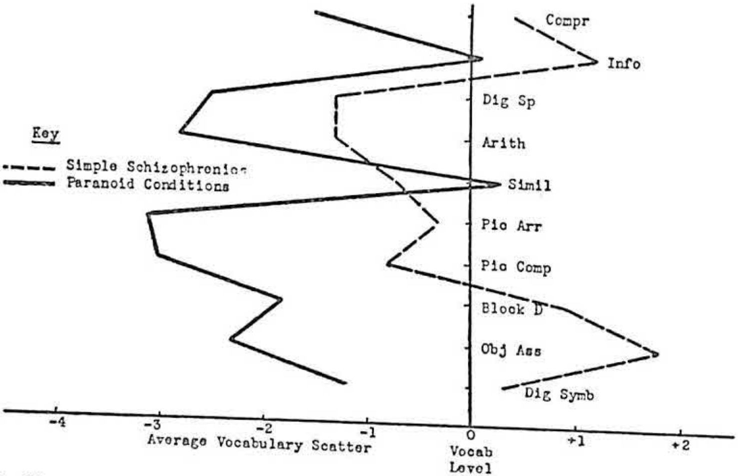


FIG. 19: GRAPH 3.—SCATTERGRAM OF THE PARANOID CONDITIONS AND SIMPLE SCHIZOPHRENICS

Subtest Averages

3. The Preschizophrenic Group. The scattergrams of both the Coarctated and Over-Ideational Preschizophrenics, in Graph 4 of Figure 19, follow closely the pattern of the Paranoid Conditions. The Over-Ideational group shows a tendency to be impaired more than the Coarctated group, and to have scores dropping to a greater extent below the Vocabulary level. This greater impairment is referable to the fact that the Over-Ideational Preschizophrenics have a much higher Vocabulary level than the Coarctated Preschizophrenics, this difference being the most reliable basis for differentiating these two groups; and though both have their best retention of efficiency on Information and Similarities, this again occurs on a much higher weighted score level in the Over-Ideational group.

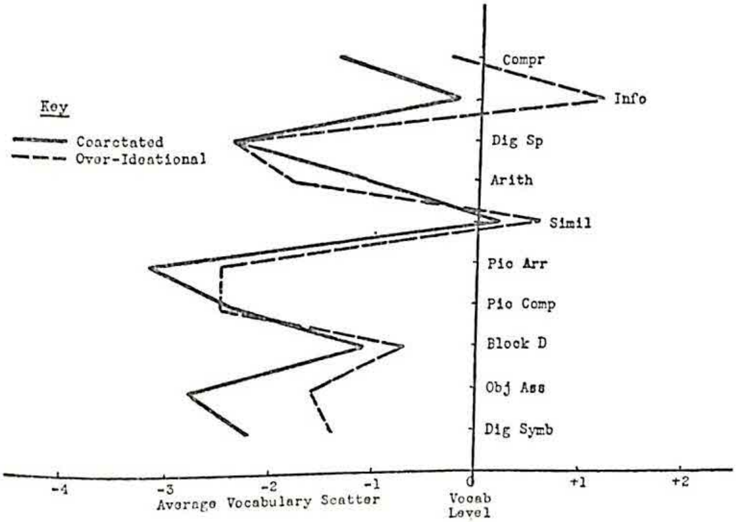


FIG. 19: GRAPH 4.—SCATTERGRAM OF THE PRESCHIZOPHRENICS
Subtest Averages

It is important to notice that the scatter pattern of these Preschizophrenics follows the same trend as that discovered in the Schizophrenic groups and the Paranoid Conditions: Comprehension shows some impairment; the two visual organization subtests show considerable impairment; Block Design is fairly well-retained; Object Assembly and Digit Symbol show impairment as in the Acute Schizophrenics. The Preschizophrenics may be differentiated from the Acute Unclassified Schizophrenics especially by the milder impairment in the former of Arithmetic (concentration) and their lack of impairment of Similarities (concept formation). The milder impairment of Arithmetic differentiates the Preschizophrenics also from the Paranoid Conditions.

In addition to the scattergram, the examiner will want to use here other features of the test to differentiate Preschizophrenics from Acute Schizophrenics. Reference to the weighted scores will show that the Preschizophrenics function on a higher level than the Acute Schizophrenics; and reference to the item-analysis, and a qualitative analysis of the patient's responses, will show that misses on the easy items and bizarre verbalizations are relatively infrequent in the Preschizophrenics, in contrast to the Acute Schizophrenics. In some cases, of course, such additional references will not clinch the differential diagnosis; in such cases it is necessary to turn to the other tests of the battery to make the differentiation.

4. The Depressive Groups. The scattergrams of the four Depressive groups, in Graph 5 of Figure 19, reveal that the two Psychotic Depressive groups do worse on all the Performance subtests than the two Neurotic Depressive groups. We have repeatedly stressed that the severity of depression is closely paralleled by the extent of impairment on the Performance subtest scores; and this parallelism becomes clear in these scattergrams. No schizophrenic groups, not even the Deteriorated Schizophrenics, show such a consistently great impairment on all the Performance subtests as the two Depressive Psychosis groups. This scatter pattern is of crucial diagnostic significance for differentiating Depressive Psychoses from Schizophrenia.

In none of the Depressive groups is there a special impairment of the visual organization subtests—Picture Arrangement and Picture Completion—such as is always found in the Schizophrenics, Preschizophrenics, and Paranoid Conditions. In further contrast to the Schizophrenics, the Block Design Subtest in all the Depressive groups is as impaired as the other Performance subtests.

On the Verbal subtests the two Depressive Psychosis groups show more or less impairment of Comprehension and Similarities, but both groups are strikingly impaired on Digit Span and, to a slightly lesser extent, on Arithmetic.

It may be worthwhile to point out some of the differences between the two Depressive Psychosis groups. The Involutional Depressives suffer no special impairment of Vocabulary as the Psychotic Depressives do; this finding may be taken as a reference point for their differentiation. The Involutional group shows no severe impairment of judgment, but tends to suffer more than the Psychotic Depressive group on Information, Arithmetic, Picture Arrangement, and Digit Symbol. Furthermore, the scattering of the five Performance subtests is more consistent in the Psychotic Depressive group. The Involutional Depressives tend to be superior on Object Assembly; the Psychotic Depressives tend to be superior on Picture Arrangement.

The differential diagnosis between either of the two Depressive Psychosis groups and the two Depressive Neurosis groups can be easily made by reference to the extent of impairment on the Performance subtests. The two Depressive Neurosis groups show a roughly equal extent of impairment on all these. These Depressive Neurosis groups may be differentiated from the Depressive Psychoses also by their excellent retention of Similarities, and by their somewhat better retention of Information and Digit Span. In general, the scattergram of the two Depressive Neurosis groups is similar to that of the two Depressive Psychosis groups; but the quantitative differences are so great, and Similarities is so well-retained in the Neurotics and so impaired in the Psychotics, that the differentiation is quite sharp.

Some reference points for the differential diagnosis of the Neurotic Depressives and the Severe Neurotic Depressives may be mentioned here. On the Performance subtests the Severe Neurotic Depressives show a somewhat greater tendency to be impaired than do the Neurotic Depressives; this is the case especially on Block Design and Digit Symbol, which we have seen to be the most sensitive to the presence of depressive trends. But on the Verbal subtests the Neurotic Depressives are consistently worse than the Severe Neurotic Depressives;[105] and concentration (Arithmetic) and judgment (Comprehension) are especially impaired. The scattergram of the Neurotic Depressives on the verbal subtests is much like that of some of the Acute Schizophrenics; the differential diag-

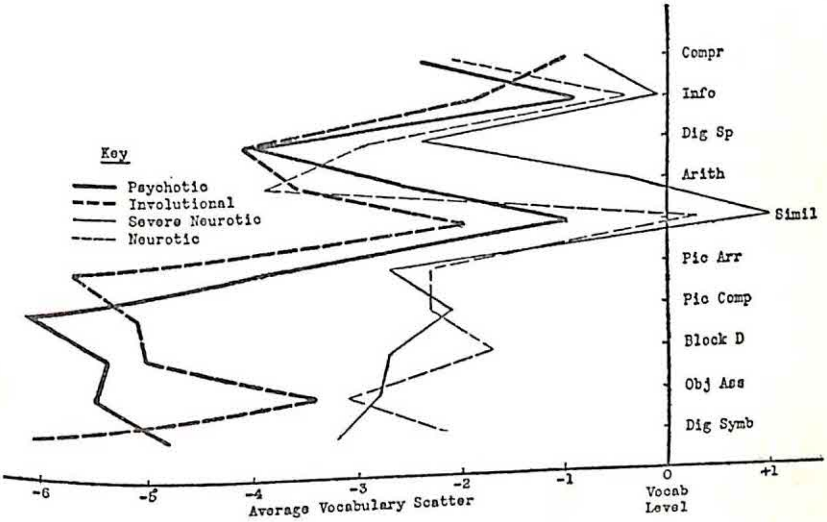


FIG. 19: GRAPH 5.—SCATTERGRAM OF THE DEPRESSIVES
Subtest Averages

---

[105] The explanation of this paradoxical finding lies in that there is a trend for impairment of Vocabulary present in Severe Neurotic Depressives, while there is none in Neurotic Depressives.

nosis is established on the basis of the uniform lowering of the Performance subtest scores. For greater security of diagnosis, the examiner may always turn to a qualitative analysis of the responses; he will find few if any bizarre verbalizations, but rather a slowness, a blocking, and a scantiness of production in the Neurotic Depressives.

In summarizing the Depressive scattergrams, one may say, first, they are all rather uniformly impaired on the Performance subtests, in which they show no similarity to the Schizophrenics; secondly, the extent of impairment is roughly parallel to the severity of the depression; finally, on the Verbal subtests the impact of anxieties upon attention is very strong, and is reflected in the relatively great impairment of Digit Span in all these Depressive groups.

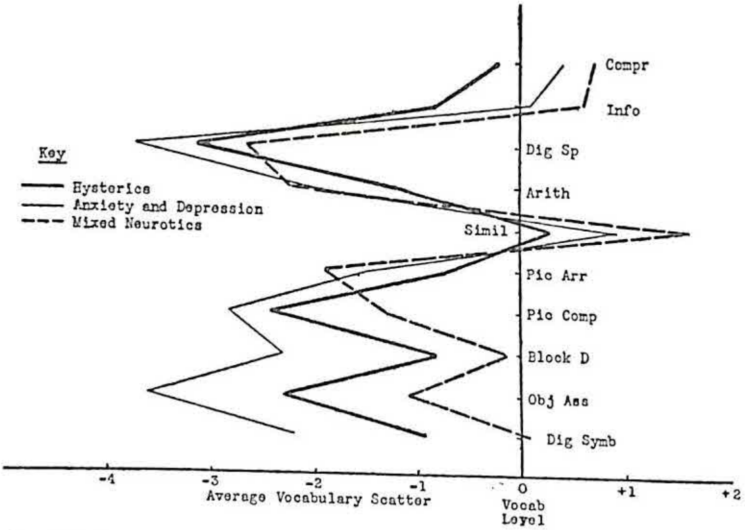


FIG. 19: GRAPH 6.—SCATTERGRAM OF THE HYSTERIA, ANXIETY AND DEPRESSION, AND MIXED NEUROTIC GROUPS
Subtest Averages

5. The Neurotic Groups. The scattergrams of the Neurotic groups are divided into two graphs: first, the Hysterias, the Anxiety and Depression group, and the Mixed Neuroses (Graph 6, Figure 19); second, the Obsessional-Compulsion group and the Neurasthenias (Graph 7, Figure 19). For brevity's sake, the Obsessive-Compulsion and Neurasthenia groups will be referred to as obsessive-like groups, and the other three as hysteric-like groups.

The most characteristic difference between them is that the Comprehension scores of the hysteric-like groups are better than their Information scores; for the obsessive-like groups the opposite is true. The rationale for this reversal has been already discussed[106] in terms of the presumed psychodynamics of these different types of Neuroses. It is also characteristic of the hysteric-like groups that while their Comprehension, Information, and Similarities scores are close to the Vocabulary level, their Digit Span and Arithmetic scores show considerable impairment. We have described these groups as the most anxious ones of our Neurotic groups, and the specific effects of anxiety upon Digit Span and, to a somewhat lesser extent, upon Arithmetic are here seen.

It is further remarkable that none of the previously discussed groups has shown such an even retention of the essentially verbal subtest scores around and above the Vocabulary level. It appears then characteristic of these hysteric-like groups on the verbal part of the Bellevue Scale to show an excellent retention on the four essentially verbal subtests, which underscores the specific impairment on Digit Span and Arithmetic.

On the Performance subtests, there are some differences between these three groups. Here the Anxiety and Depression group shows the greatest extent of scatter, which is similar to the scatter of the Neurotic Depressives. This was to be expected from this group's strong depressive trends. The differentiation of Neurotic Depression from the Anxiety and Depression state is to be made in terms of the Verbal subtests in general and of Comprehension in particular. The other two of these groups show less impairment on the Performance subtests, especially on Block Design and Digit Symbol, which we have repeatedly stressed to be the most vulnerable to depressive trends. The relatively greater impairment of Picture Completion and Object Assembly than of other subtests in all these groups appears to be associated with the impairment of Digit Span and Arithmetic; we have seen in our detailed analysis that on all four the presence of strong anxiety may encroach considerably upon efficiency of performance.

Turning to the obsessive-like groups, we see the tendency for their Comprehension to be impaired, while their Information is well-retained and somewhat superior to Vocabulary. Anxieties are strong in these groups too; hence we see a great impairment on Digit Span and, in the Obsessive-Compulsives, on Arithmetic. In the Obsessive-Compulsives we find an impairment of Arithmetic relatively greater than that found in any other Neurotic group. We have seen how, in the Schizophrenics, Arithmetic tends to show considerable impairment as a reflection of the impairment of concentration; and this finding in the Obsessive-Compulsives offers an opportunity to point out that their scattergram is in other respects also similar to the Acute Unclassified Schizophrenics. In both Comprehension (judgment) shows impairment, Arithmetic (concentration) shows impairment, the two visual organization subtests show a somewhat greater impairment than Block Design, and even Similarities shows some impairment. The Obsessive-Compulsives, however, may be differentiated from the Schizophrenic groups by reason of their scatter occurring on a much higher weighted score level—as may be seen in their average Vocabulary weighted scores—and by their infrequency of peculiar answers or misses on easy items.

---

[106] See pages 120–122.

The differentiation of the Obsessive-Compulsives from the Paranoid Conditions is centered on the impairment of Similarities in the former; but in most cases reference must be made to the qualitative features of the patient's verbalization.

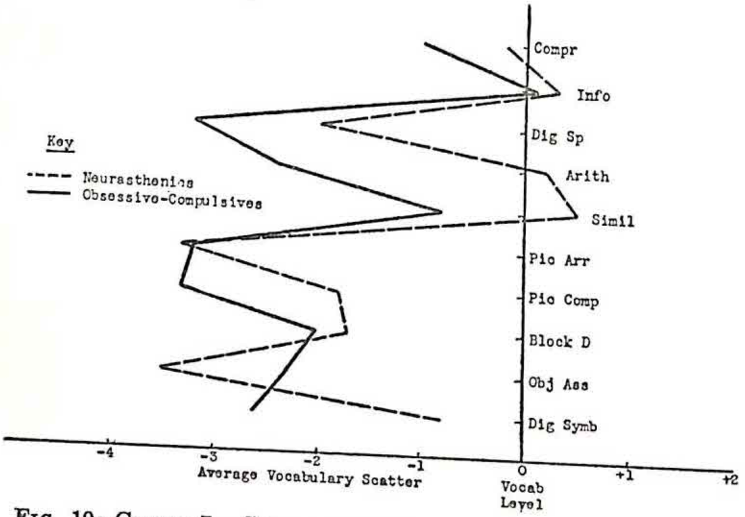


FIG. 19: GRAPH 7.—SCATTERGRAM OF THE NEURASTHENIC AND OBSESSIVE-COMPULSIVE GROUPS
Subtest Averages

The differentiation of the Obsessive-Compulsives from the Preschizophrenics may be made with reference to the impaired Similarities and Block Design in the former; the Preschizophrenics are excellent on Similarities, and only slightly impaired on Block Design.

We see on this scattergram that the average Vocabulary score of the Neurasthenics is relatively low; hence the impairments on the Performance subtests represented in this scattergram indicate a low level of efficiency. This results from the sluggishness and dis-spiritedness of the Neurasthenics. Their verbal scores appear to remain on a relatively even, though low, level.

6. The "Normal" Control Group. We shall discuss the scatter pattern of our control group from two points of view: (1) we shall compare the average scatter of the entire Patrol with that of the clinical groups, in order to determine how the scatter of "normals in general" differs from them; (2) we shall not be satisfied with this consideration of "normals in general", but shall discuss also the scatter patterns found in different types—schizoid (Graph 9), anxious[107] (Graph 10)—of normals.

The Vocabulary scattergram of the total Patrol presented in Graph 8 of Figure 19 shows that the range of scatter is smaller than in any of the clinical groups, not excepting even the most efficient of our Neurotic groups. On no subtest does the average negative scatter in the Patrol reach two weighted-score units; in all the clinical groups, at least one subtest, and often more, shows an average scatter greater than two weighted-score units. It is especially striking how close to Vocabulary the Patrol's Comprehension, Information, and Similarities scores remain. These subtests together with Vocabulary, we have described as the four essentially Verbal subtests of the Bellevue Scale; this graph therefore indicates that in normals the scores of these four subtests should cluster very closely together.[108] As we have seen, the same tendency is present in the three

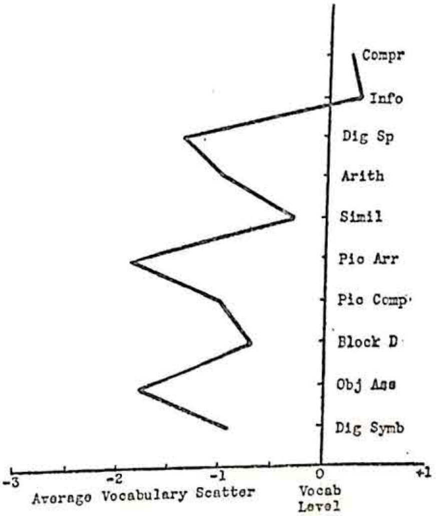


FIG. 19: GRAPH 8.—SCATTERGRAM OF THE TOTAL CONTROL GROUP
Subtest Averages

---

[107] For the basis of these divisions, see the corresponding section on nosology, pages 28–31. We shall forego a discussion of the "depressive" normals, since no very clear trends were discovered to differentiate them from other types of normals. An inclination toward mild mood swings on the depressive side, if occurring in a "normal" subject, does not necessarily impair certain subtest scores. Certain of our "depressive" patrolmen showed significant impairment along the lines found in Neurotic Depressives, but these were a minority, and do not influence the average scattergram to a sufficient degree.

[108] We have already seen in the discussion of Mean Verbal Scatter, in the section on Major Scatter Patterns, that not one case among the Patrol had "extreme" scatter on these four essentially Verbal subtests.

hysteric-like groups. It appears then that any great scatter among these four subtests is an indication of rather severe pathology. A more careful scrutiny of the averages on these four subtests in the Patrol is of importance. Information and Comprehension are somewhat above the Vocabulary level, while Similarities is somewhat below. We have previously discussed the impairing influence of poor cultural background on efficiency of verbal concept formation (Similarities) and, to a lesser extent, on Vocabulary. Even within the closely clustered averages of the control group these trends come to expression; and their significance for the clinical examiner is that he must keep in mind the individual's specific cultural background when assessing his scatter. The small average differences indicate merely that only in a few cases will the "cultural poverty" be clearly expressed in the test scores.

The Patrol, though showing within its own range great scatter on Picture Arrangement and Object Assembly, nevertheless does not reach the degree of impairment on them found among the clinical groups. Impairment on Object Assembly in the Patrol is no surprise, since we have seen what a great variety of factors can impair efficiency on this subtest. On Picture Arrangement, the impairment which was more or less consistent throughout the Patrol we felt to be referable essentially to the highly sophisticated nature of the tasks and the anticipations required, which put the Patrol with its rural background at a disadvantage.

One further comment about the scattergram of the total Patrol is in place here. It will be noticed that Digit Span and Arithmetic show a definite drop below the Vocabulary level. These two subtests were included by Wechsler as "verbal" subtests; but our findings tend to show that they are not homogeneous with what we have called the four essentially Verbal subtests.[109]

What are the changes in the Patrol's scatter pattern if we break down the total group into Schizoid and Non-Schizoid Normals? The most striking change, as far as the Schizoids are concerned, is the superiority of Digit Span and, to a lesser extent, Arithmetic scores over the Vocabulary level. In contrast, the Non-Schizoids show significant impairment on these two subtests. In other words, a significant superiority in Normals of Digit Span over all the other subtest scores, and even Vocabulary, is a reliable indicator of the presence of schizoid trends. This fact is similar to that found in the Schizophrenic groups, and especially in the

---

[109] Since Digit Span especially shows little homogeneity with the other subtests, and since Wechsler suggests that the Vocabulary score may be used as an alternative verbal subtest score in computing the I.Q., we suggest that the Vocabulary score be routinely substituted for the Digit Span score in computing the Verbal and Total I.Q. However, we advise against omitting either of these subtests, for they are both of crucial significance in evaluating the type and severity of disturbance of the subject.

Acute Unclassified Schizophrenics, who frequently showed excellent retention and even unusually sharpened efficiency on Digit Span. The specificity of the effects of schizoid trends is further emphasized by the fact that the other Verbal subtest average scatters remain about the same for Schizoids and Non-Schizoids.

Turning to the Performance subtests, it is apparent that the schizoid trends are detrimental to efficiency on Object Assembly and Picture Completion. On Object Assembly the Schizoids show the greatest impairment on any single subtest found in the Patrol breakdowns. The reader will remember in the Acute Schizophrenics too we found extreme impairment on Object Assembly. On Picture Completion the average score of the Schizoid Patrol is a whole weighted-score unit lower than the Non-Schizoid Patrol's. A similar vulnerability of Picture Completion in the Schizophrenic groups was also found.

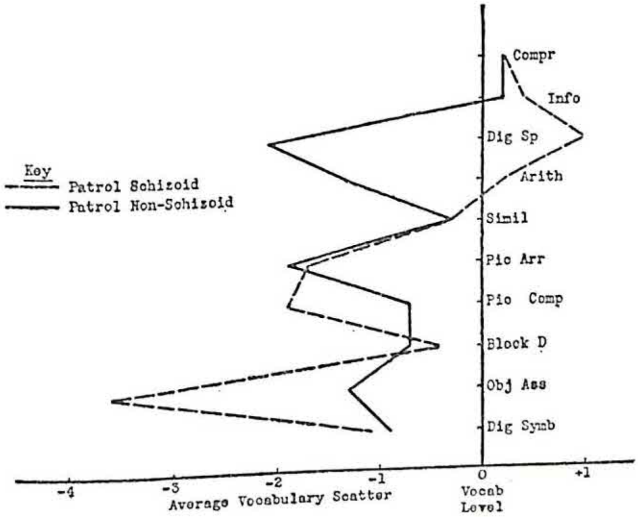


FIG. 19: GRAPH 9.—SCATTERGRAM OF THE SCHIZOID AND NON-SCHIZOID CONTROL GROUPS

Subtest Averages

We see then that in many respects the Schizoid Normals have scatter patterns similar to those found in the Schizophrenic groups. The differential diagnosis from Schizophrenia or Preschizophrenia is easily made with reference to the lack of impairment—and even a heightening of efficiency—on Arithmetic, and lack of impairment on Comprehension, in Schizoid Normals. Furthermore, the extent of impairment is, with the exception of Object Assembly, much milder.

What are the changes in the Patrol's scatter pattern if we break down the total group into Anxious and Non-Anxious Normals? Surprisingly enough, the Anxious Patrol is as good as, or in most cases better than, the Non-Anxious Patrol. This is especially true on the Performance subtests, with one significant exception—Object Assembly. We have repeatedly stressed how vulnerable Object Assembly is to a variety of factors; and now, even within the normal range, we see it impaired not only by schizoid trends but also by the presence of anxiety. But the most striking inefficiency in the Anxious Patrol is on Digit Span. We have seen this same striking inefficiency in the Neurotic groups, especially those characterized clinically by acute anxiety; and we see here that, within the normal range, anxiety is a potent factor making for impairment of Digit Span (attention). An Anxious Normal is therefore differentiated from a Non-Anxious Normal by impaired efficiency on Digit Span and, to a lesser extent, on Object Assembly.

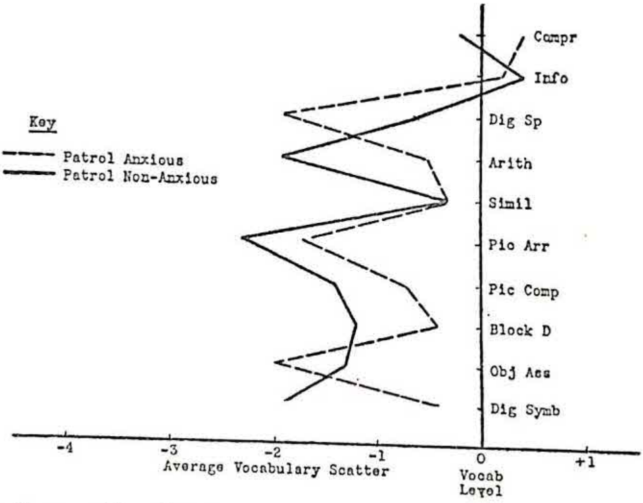


FIG .19: GRAPH 10.—SCATTERGRAM OF THE ANXIOUS AND NON-ANXIOUS CONTROL GROUPS

Subtest Averages

Why the Anxious Patrol should be better in other respects than the Non-Anxious Patrol, we cannot quite account for. But it was apparent in the testing of these cases that the Anxious subjects became considerably more involved in the tasks and put more pressure upon themselves to perform quickly, thereby gaining additional time-credits where these were obtainable. That such increased pressure is of little avail in improving attention is shown by the fact that the Anxious Patrol is significantly worse on Digit Span than the Non-Anxious Patrol; and that it is of little avail in improving the visual-motor coordination required by Object Assembly is also apparent from the scattergram.[110]

7. *High and Low Weighted Scores.* We should like to offer here another appraisal of characteristic differences in terms of the relative frequency in our clinical and control groups of extremely high weighted scores (15 or more) and extremely low weighted scores (5 or less). Figure 20 presents the percentage of incidence of such high and low weighted scores for all our groups.

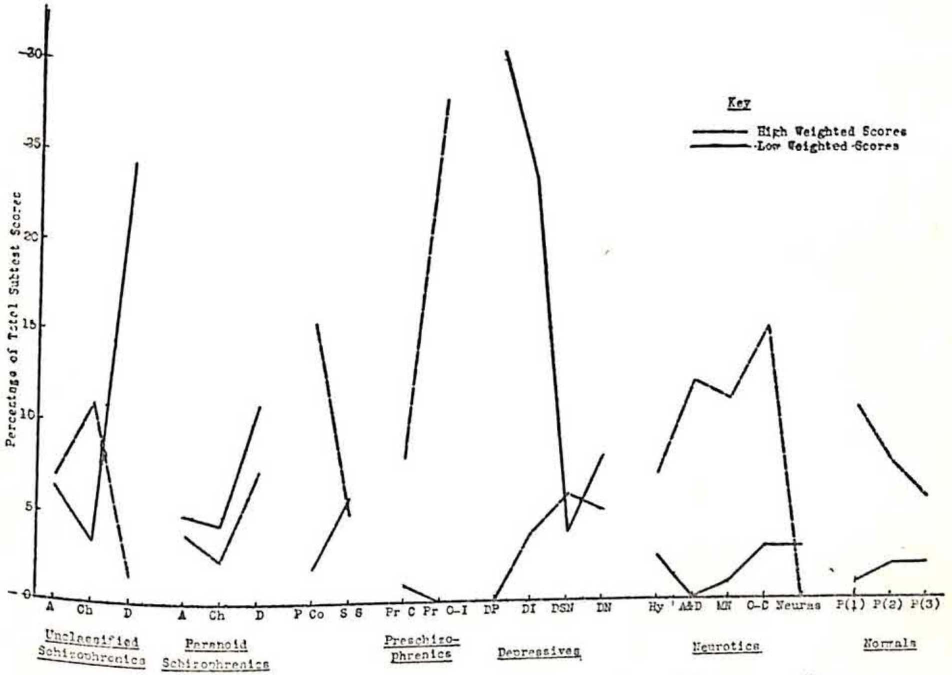


FIG. 20.—PERCENTAGE OF EXTREME HIGH AND LOW WEIGHTED SCORES
(For the limits of low scores, see Table 5. The limits of high scores are "15 or above")

In regard to the extremely low weighted scores, it is immediately apparent that there are three groups in which they are most frequent, occurring in 25–33% of all subtest scores: the Unclassified Deteriorated Schizophrenics, the Psychotic Depressives, and the Involutional Depressives. The lowest incidence—no more than 3%—occurs in the Preschizophrenics, the Paranoid Conditions, the Neurotics, and the Normals. The other

---

[110] That anxiety is not too crucial a factor making for impairment on Arithmetic is demonstrated by the low negative Vocabulary Scatter of Arithmetic in the Anxious Patrol. The Non-Anxious Patrol, a group defined only by exclusion of the Anxious Patrol, shows a great amount of impairment on Arithmetic (concentration). We did not track down any personality characteristics common to this negatively-defined group, and cannot therefore offer an explanation of this finding.

Schizophrenic groups and the other Depressive groups fall in the intermediate range. A great incidence of extremely low weighted scores, therefore, must be taken as evidence for a Psychotic Depression, or Schizophrenic deterioration, or at least some form of Schizophrenia or Depression.

If we turn to the incidence of high weighted scores, we find the trends reversed, and the greatest incidence occurs in the Over-Ideational Preschizophrenics and in the characterologically-related Paranoid Conditions and Obsessive-Compulsives. The lowest incidence occurs in the Unclassified Deteriorated Schizophrenics, the Psychotic Depressives, the Neurasthenics and, to a lesser extent, the Acute and Chronic Paranoid Schizophrenics and Involutional Depressives. The finding regarding the Neurasthenics is of special interest, since it shows that they tend to have neither very low nor very high weighted scores. This group shows considerable impairments which, though not severe enough to bring the scores into the extremely low weighted range, prevent the attainment of even a single high weighted score. The findings for the Unclassified Deteriorated Schizophrenics and the Psychotic Depressives were, of course, to be expected. It is interesting to note, however, that the Deteriorated Paranoid Schizophrenics are much better than the Deteriorated Unclassified Schizophrenics, and have an incidence of high weighted scores equivalent to that of the Acute Unclassified Schizophrenics, the Neurotic Depressives, and the Hysterics. We have already seen that certain of their scores—especially Comprehension, Picture Arrangement and Object Assembly—may be well retained, and it is on these subtests that the high weighted scores were achieved. This superiority of the Deteriorated Paranoid Schizophrenics over the Deteriorated Unclassified Schizophrenics is to be kept in mind for differential diagnosis.

It should be noted that although the Patrol constitutes our "normal" group, the greatest incidence of high weighted scores should not be expected in them. Even the Well-Adjusted Patrol falls into the range only of the moderately well-performing Neurotics, while the Borderline-Adjusted Patrol falls into the range of the poorer-performing Neurotics.

In summary, one might say that Figure 20 demonstrates that the greatest incidence of extremely low weighted scores occurs in the most disorganized psychotic groups, and the greatest incidence of extremely high weighted scores occurs in those groups given to "intellectualization".

CHAPTER III

THE BABCOCK TEST

A. INTRODUCTION

There are three reasons for including the Babcock Test[1a] in our battery.

First, perhaps the most serious shortcoming of the Bellevue Scale is the fact that it contains no subtest which tests memory functioning in a more direct way than the Information subtest. Experience shows that an adequate assessment of the subject's efficiency of intelligence is not possible without a test of his efficiency of memory. Furthermore, for clinical work we have found disturbances of memory efficiency to be of diagnostic significance. The Babcock Test includes tests of memory efficiency.

Secondly, before the Bellevue Scale was developed and before our experience with it was extensive enough so that we could formulate those conceptions of "scatter" advanced in the previous chapter, we found the Babcock Test useful because it allowed for direct comparison of efficiency on its different subtests with the Vocabulary level. As we shall see in a later discussion of the structure of the Babcock Test, this test by the very nature of its construction provides the examiner with Efficiency Scores which are equivalent to Vocabulary Scatter in the sense described in the preceding chapter. After developing concepts of scatter which could be applied to the subtest scores of the Bellevue Scale, we nevertheless retained the Babcock Test in our battery, not only because it includes subtests which are missing in the Bellevue Scale, but also because its Efficiency Scores are in some respects more sensitive than those one can obtain from scatter analysis of the Bellevue scores.

Thirdly, it was our hope that a thorough investigation of the potentialities of the Babcock Test over a relatively large and varied body of cases would lead to a simplification of it, in which the unnecessary parts would be eliminated, the essential parts retained, and used in such a manner as to make the Efficiency Scores diagnostically even more sensitive.

Our inclusion of the Babcock Test in our battery does not imply agreement with the notions advanced by Babcock about the nature of intelligence and the nature of her test. Adhering to our plan, we shall avoid discussion of views and results of previous work on the test.[1b] We shall not enter here into a discussion of the concepts of "deterioration" or of "efficiency". We have already presented our point of view of efficiency in the introduction to the chapter on intelligence testing; and we discussed the matter of deterioration implicitly in connection with the visual-motor-coordination subtests of the Bellevue Scale. We came to the view that the hope of being able to measure "deterioration" by a single number should be abandoned; and rather, patterns of performance on several kinds of tests should be used as the basis for inferring the extent of deterioration or of lowered efficiency.

[1a] Babcock (2).

[1b] A brief review of the literature of the test will be found in Appendix III, pages 548 ff.

The plan of this chapter is as follows: (1) we shall describe in general terms, the structure of the Babcock Test, the method of obtaining Efficiency Scores with it, and the general significance of these Efficiency Scores; (2) we shall present a psychological rationale of the functions underlying the achievement on each of the subtests, and at the same time attempt to show why we introduced certain modifications of the test, based on this psychological understanding of the nature of the subtests as well as on some general statistical trends in our material; (3) we shall put forth some general suggestions about administrative technique; (4) we shall present a statistical analysis of the Efficiency Score patterns of the clinical and control groups; (5) the average subtest and efficiency scores of all our groups, and the subtest scores and efficiency scores of each subject, will be presented in Appendix II (see pages 515 ff.).

B. THE GENERAL STRUCTURE OF THE TEST

The Babcock Test in its original form had 24 subtests; a "short form" was also standardized, consisting of only 9 of these. It is this short form (2) which we have used consistently.

Babcock divided these 9 subtests into three groups designated by her as Learning, Motor, and Repetition groups. From the scores achieved by a normal standardization population, Babcock established for each of the Vocabulary Ages of the 1916 form of the Stanford-Binet Test a norm—that is, an expected average subtest score—for each of the three groups of subtests, as well as for all 9 subtests taken together. Thus, the Vocabulary score of a subject is translated into a Vocabulary Age according to the old Stanford-Binet Scale, and the expected Learning, Motor, Repetition, and Total averages corresponding to this Vocabulary Age are found in Babcock's table. The scores actually obtained are averaged similarly, and the 4 *expected* averages are subtracted from the 4 *obtained* averages, yielding four Efficiency Scores. If the obtained average is below the expected average, the Efficiency Score is negative; if above, it is positive.

In general, the scores on Babcock's 9 subtests are not directly comparable to each other, inasmuch as no uniform weighted score scale was established. Thus, for example, the norms for achievement on the 3 different groups of subtests are frequently quite different; or in other words, lower scores on one group of subtests are equivalent in efficiency to higher scores on another group. Thus, only the efficiency scores—that is to say, the relation of the obtained scores to the expected scores—are directly comparable with each other inasmuch as they are differences and hence "relative" measures, independent of whatever the measuring unit may have been originally, and independent of the absolute level of the original scores.

One of the fundamental aims of scatter analysis on the Bellevue Scale was to get away from the absolute score-level, so that *patterns* of achievement and impairment could be studied rather than the achievement and impairment per se. We see here that the Babcock Test, by the very nature of its construction, measures scatter (Vocabulary Scatter) and provides Efficiency Scores which are directly comparable and independent of absolute score-levels.

C. THE SUBTESTS AND THEIR PSYCHOLOGICAL RATIONALE

We shall now turn to the discussion of the subtests of the Babcock Test, according to the groups they were put into by Babcock—that is, the Repetition, Learning, and Motor groups.

1. The Subtests of the Repetition Group. Babcock included 3 subtests in this group. The first two[2], subtests 6 and 7—Digit Span Forward and Digit Span Backward—do not differ essentially from the Digit Span subtest of the Bellevue Scale. There are three differences: (a) For each number of digits two series are given, whether or not the first was passed by the subject. For any failure, whether on the first or the second series, a credit is subtracted. This method of testing Digit Span gives more opportunity for detecting temporary inefficiencies. (b) While the Bellevue extends only to 9 digits forward and 8 digits backward, the Babcock extends to 10 forward and 10 backward. This allows subjects to better demonstrate their proficiency. (c) In contrast to the Bellevue Scale, Digit Span Forward and Digit Span Backward are here given as separate subtests with different scoring-scales; these are adapted to the fact that Digit Span Backward is a harder task than Digit Span Forward.

In our detailed treatment of the Digit Span subtest of the Bellevue Scale, we attempted to show that it is a test of attention. We shall not go further into the rationale of the Digit Span subtest here.

The third subtest included in this "Repetition" group is Sentence Repetition. A series of 23 sentences[3] of increasing length is read one by one to the subject, who is instructed to repeat each sentence verbatim.

[2] The numbering is that of the "long form" of the Babcock Test.

[3] 1. Mama. 2. Nice kitty. 3. In summer the sun is hot. 4. When the train passes you will hear the whistle blow. 5. Last year fifteen new houses were built on this street. 6. The price of potatoes is fifteen cents a peck. 7. The road up the mountain was very rough and steep. 8. Walter had a fine time on his vacation;

Since this subtest involves meaningful material which conveys to subjects varying degrees of familiarity, it is much less a test of attention than Digit Span, where meaningful associations are rarely possible and then only in highly intelligent and purposeful people.

The difference between the Digit Span subtests and the Sentence Repetition subtest may be characterized as follows: in repeating a meaningful sentence, if the subject momentarily forgets one word, the pattern and meaning of the sentence facilitate its reconstruction—or "figuring out". Furthermore, on the first 15 sentences one distortion or omission does not make for complete failure of the item, but allows half-credit according to Babcock's instructions.

It is not surprising, then, that this subtest is rarely severely impaired. We do not imply here that it is not worthwhile to administer the test, or that in psychotics and in borderline cases it does not elicit interesting distortions which may serve as qualitative diagnostic clues; but even where such suggestive qualitative clues occur, the test score itself tends to remain relatively unimpaired, at least much less impaired than Digit Span.

TABLE 60.—*Average Scores on the Repetition Subtests*

Group	No. of Cases	Average Repetition Norm	Average Subtest Scores		
			No. 6 (D.S.F.)	No. 7 (D.S.B.)	No. 19 (S.R.)
Schizophrenics	42	14.7	12.0	13.0	15.0
Depressives	17	14.4	11.5	12.7	15.9
Neurotics	40	15.2	13.1	13.3	16.9
Patrol	54	15.1	12.6	14.1	16.5

In Table 60 we present the average Repetition norm and average score of Digit Span Forward (No. 6), Digit Span Backward (No. 7), and Sentence

---

he went fishing every day. 9. The river flowed by with a pleasant soothing sound. 10. The breeze was strong and the sailboat sped over the water. 11. The baseball game yesterday was won in the very last inning. 12. To take a picture of the moon one must have a large camera and a good lens. 13. When the train crosses the road the engineer will blow the whistle and the fireman will ring the bell. 14. Children, it is necessary to work for a living; you must go to your school every morning. 15. An old man sitting in the corner put down his paper and looked at him as he entered the room. 16. Last year there were only twenty children in the school, but this year there are fifty because the town has grown so. 17. When the girl entered the streetcar with her bag all the seats were filled and people were standing in the aisles. 18. The church was cool and dark and at the far end there was a high altar of marble. 19. Walter likes very much to go on visits to his grandmother because she always tells him many funny stories. 20. Yesterday I saw a pretty little dog in the street; it had curly brown hair, short legs, and a long tail. 21. As the great red sun came over the hills the Indians broke camp and prepared for another day's hard work. 22. The clouds hung low in the valley and the wind howled among the trees as the men went on through the rain. 23. One thing a nation must have to become rich and great is a large secure supply of wood.

Repetition (No. 19) for our major clinical and control groups. This Table reveals that in all the clinical and control groups the Digit Span subtests show a drop below the Repetition norm. This would be expected, on the basis of our findings on Digit Span in the Bellevue Scale, where the drop for the Patrol was explained by the great number of anxious subjects it contained. Sentence Repetition, however, is in all the groups well above the Repetition norm. Thus our contention that these subtests measure different functions, appears to be borne out by these statistics. For this reason, in the following statistical analysis—and in our everyday clinical work—we consider as Repetition subtests only the two Digit Span subtests, leaving out Sentence Repetition.

The reader who is inclined to consider Digit Span Backward and Digit Span Forward merely as more difficult subtests which are thus more vulnerable, and Sentence Repetition as an easier test which is thus more stable, is overlooking both theoretical and practical differences. Theoretically, he puts himself in the position of having to explain *why* one is more difficult than the other; and at the same time he overlooks the great qualitative difference between the *meaningless* character of Digit Span and the meaningful character of Sentence Repetition. Practically, though he argues that a fair test will give the subject a chance to try himself on less difficult and more difficult material, he is actually—as we shall show later—sacrificing the differential diagnostic potentialities of Digit Span to Sentence Repetition.

The reader may argue that our modified Repetition Efficiency Scores are not valid because the norms were standardized on all three Repetition subtests. In reply, one may well question how psychologically valid the original norms are, if they are based on an *a priori* grouping of three subtests which do not essentially belong together. Norms can be worked out for any set of averages on a group of subtests; the meaning of such norms will be as confused or as clear as the psychological coherence of the subtests grouped together. Further, clinical psychological testing aims at differential diagnoses. If modifications, based on experience, are introduced into standardized tests, the essential criterion for evaluating the modifications is whether they make the test a more sensitive diagnostic tool. We shall attempt to show that our modification meets this criterion.

2. The Subtests of the Learning Group. The Learning group includes 4 subtests. The first of these (No. 4 in the long form) is the Story Recall. The following story is read to the subject by the examiner: "December 6. Last week a river overflowed in a small town ten miles from Albany. Water covered the streets and entered the houses. Fourteen persons were drowned and 600 persons caught cold because of the dampness and cold weather. In saving a boy who was caught under a bridge, a man cut his hands."

The subject is then told, "Begin at the beginning and tell me all you remember of it." After his response, the story is read again to the subject; and the delayed recall of the story (subtest No. 11) is given by the subject after about 10 minutes of work on other subtests. There are 21 unit memories that can be credited in each recall; the number of correct memories is the score. 4 extra credits are added to the score on Immediate Recall in order to eliminate the advantage of the re-reading for the Delayed Recall.

A few words concerning administration are necessary here in order to understand properly the significance of these subtests. After the subject has given the Immediate Recall, the examiner says, "Later, I will want to see how much of it you can still remember"; he then pauses, as if giving the subject a chance to think over the story, and continues, "I will read it to you again"; he then does so. Only when the administration of the 5th, 6th, 7th, 9th, and 10th subtests is finished, is the Delayed Recall asked for.

The psychological meaning of the Immediate Recall of this story is obvious. The subject is not asked, as on Sentence Repetition, to recall verbatim single, brief sentences; rather he is required to grasp the meaning of the story, which he may re-tell in his own words. No exchange of one expression for another is penalized, so long as the change does not alter the general meaning of the story or its details. Thus, what is being tested here is the accuracy of *meaningful* memories, relatively independent of exact verbal reproduction. Lack of accuracy is penalized; saying "in Albany" instead of "10 miles from Albany" is penalized by loss of both scores which would have been obtained for "10 miles" and for "from Albany". However, memories such as "near Albany" or "in the neighborhood of Albany" are not especially penalized, except that the omission of "10 miles" loses one unit. Introduction of bizarre elements contradictory or alien to the stories are the only changes really penalized: according to Babcock's scoring, one unit is subtracted from the score for each bizarre detail introduced.

In the monograph, "Emotions and Memory" (22), one of the present authors suggested that organization and distortion of memory material in recall gives clues as to what happens in the everyday memory functioning of the subject, and that memory should be looked upon as one aspect of our thought processes. Thus, memory for meaningless material, as most frequently tested by academic psychologists in their efforts to study memory, cannot give information about the organization of memories that is characteristic of memory functioning as we experience it, use it, and observe it in our everyday life. Our discussion on Digit Span in the Bellevue Scale attempted to shed some light on one of the psychological functions

—attention—involved in the immediate recall of meaningless material. It is probably demonstrable that, in learning nonsense syllables or digits for delayed recall, not only attention but also concentration is called into play. The rôle of concentration would be to introduce subjective meaning, by some act of organization or association, into the meaningless material. The examiner or experimenter is thus never quite sure of what his results mean, in terms of everyday memory functioning.

The only tests in our whole battery which attack memory-functioning directly are these Story Recall subtests of the Babcock Test.[4] In them we see the memory function in a reproductive, rather than a productive, rôle. The greater the original natural endowment and its efficiency, and the less conscious thought processes—including attention and concentration—are encroached upon by maladjustment, the more likely it is that the aspect of thought processes called memory will function freely and efficiently, and bring about good story reproductions. A freely receptive, unhampered attention will facilitate intake; concentration will be crucial in extracting the essential meaning and pattern of the story. A good span of attention is not in itself sufficient, since the story is relatively long; omissions will consequently occur in the subject's reproduction. But the examiner tells the subject that he will want to hear the story again; and the subject has a chance to think over what he has retained of the story, before the examiner re-reads it. The normal subject's reaction usually is a gesture implying, "Oh, now I know what I left out", or "How stupid I am to have left this out." Such subjective experiences help to lock the previously-omitted material firmly into the structure of the story, and thus to make the story more complete in the Delayed Recall.

Very frequently the subject, in his Immediate Recall, remarks that he knows something is missing but cannot recapture it; this would indicate that the pattern of meaning and sequence is felt by him. Before the re-reading of the story, he has another chance to think it over, which re-emphasizes the gaps or at least summarizes the retained material; and he can then measure this against the complete story as repeated by the examiner. A normal subject easily makes a comparison between his version and the complete version, and fills in his version or corrects it if there were distortions. This comparison requires the capacity for a well-organized intake of the story, and a relative independence of the memory-function from strong personal affects which tend to distort it. If the dominance of affective life results in a disorganized intake and retention of the material, the gaps will not be noticed by the subject; and the difference between the original version, as repeated by the examiner, and the subject's version will not be apparent to him. Both are organized for him in terms of the paramount affect; if a strong distorting idea or affect influences the intake the first time, it is likely to influence it the second time also, and the original distortion will persist in the Delayed Recall.

---

[4] In the minds of the present authors, the Word Association and Thematic Apperception tests are indirect attacks upon memory-functioning. In both these tests, the patterns of memory-functioning are tested in their productive aspects. The organizing, affective, attitudinal factors mobilized by a stimulus word or picture deliver to consciousness reaction words, or reaction story-pattern material, which are expressions of these factors as well as of the memory content associated with pathological disorganizing factors.

We expect normal subjects to have a relative autonomy of Ego functions, free from strong affects and drives distorting or warping thought organization and that aspect of it which we are accustomed to refer to as memory organization. As soon as such distorting affects, or strivings, or attitudes become apparent in the recall of the story—especially in the Delayed Recall—we have evidence of considerable impairment of the Ego's ability to keep its autonomy and to protect thought and memory organization from the encroachments of maladjustment. This type of memory disorganization does not become as tangible in any other test of our battery as in the two Story Recall subtests of Babcock. In these, memory disorganization is one of the most acute indicators of maladjustment approaching or reaching the psychotic degree.

Omissions, or minor errors such as "in Albany" instead of "10 miles from Albany", are expressions of temporary inefficiency, and are attributable to a limited span of attention in intake. But distortions to the effect that 1400 people were drowned and 1600 caught cold are manifestations of affective interference with memory organization and memory function. An even higher degree of disorganization is indicated when the parts of the story are given in an incorrect sequence. This occurs in normals also, as when a subject suddenly remembers something which belongs to a previous part of the story; but normals interrupt their narrative, and either by a tone of voice or by explanation indicate that they are filling in a previous gap. The situation is different when instead of a story, only fragments are recalled by the subject, and these in a completely different sequence from the correct one, with a consequent loss of cause and effect relationships. This is the case even if the subject superficially gives the impression that he is simply trying to assemble the material before he forgets it. Such a "Gestalt-Zerfall" (disintegration of structure) of the story is pathognomonic of near psychotic or psychotic conditions. In such cases the organization, coherence, and meaning of the story are lost, and correction after the second reading of the story becomes impossible. The subject's procedure in such cases becomes similar to that described in connection with the "pattern coherence" of motor actions in the Object Assembly subtest of the Bellevue Scale where guiding visual organization is absent. In memory performances, however, we see "verbal-motor coherence" replacing meaningful inter-related memories. When such a disorganization of memory is present, the experience of "Aha, now I have it"—so characteristic for the discovery of omissions in normals who give well-structured Immediate Recall—is necessarily absent. The Delayed Recall, instead of becoming more efficient than the Immediate Recall, becomes, if possible, worse. The total disorganization of the story brings about emergence of snowstorms, fires, rains, and other disasters instead of the flood. That is, there occurs a re-arrangement of the details of the story, not in terms of its *objective* meaning, but in terms of its *affective* meaning to the individual subject. This process may go even further, and recalls may be offered which have almost no resemblance to the original story.

Thus, in these two memory subtests, as soon as the autonomy of thought functioning is encroached upon by affects, we see the unconscious drive factors distorting and disorganizing memory functioning. As our experience indicates that disorganization of patterns of thought processes is among the earliest and most crucial signs of severe maladjustment, these subtests become for us potent diagnostic indicators. Not only qualitatively are they of great importance, but we shall see in the following statistical evaluation that quantitatively also they are a true help in diagnosis.

The examiner who will look upon disturbances on these two subtests as expressions of those forces which organize memory in everyday life, cause slips of tongue, accidental forgettings, persistently recurring memories, and deficiencies in the availability of memories when they are needed, will find these subtests instructive for understanding memory as it actually operates in living persons, and for understanding the state of organization and degree of coherence of the patient's thought processes.

The third subtest in the Learning group of the Babcock Test is the Symbol Digit subtest of the Army Alpha (No. 5 in the long form). The subject is given a "key" or code of 5 different geometric symbols (a square, a circle, a star, a triangle, and a cross), the numbers 1 to 5 being written inside the symbols. The subject is required to fill in the appropriate numbers in a 5-line random sequence totalling 50 of these symbols. The time required for the subject to fill in all the symbols is translated into the subtest score.

This subtest resembles in many respects the Digit Symbol subtest of the Bellevue Scale. The essential differences are, first, that not more or less meaningless symbols are being written, but motor-habituated digits; secondly, that there are only 5 symbol-digit pairs to be learned; and thirdly, that the symbols can be easily referred to by names. This makes it less a test of motor coordination, and more a test of speed, than the Bellevue test, although the general considerations advanced there hold here also. But for the same reasons, learning also proceeds faster; and its process becomes more obscured in the performance. To further complicate the evaluation of the learning factor, the test deals with essentially meaningless material: that is, geometric symbols are arbitrarily connected with digits, and their association must be learned.

Table 61 gives the average Learning norm, and the average scores for subtests 4, 11, 5, and 12 for our four major groups of subjects. This Table shows that, in the Schizophrenics and the Neurotics, the Symbol Digit (No. 5) holds up much better than Story Recall (Nos. 4 and 11). We have shown the latter to be learning tests. The inclusion of Symbol Digit in the calculation of Learning Efficiency, then, would lessen the diagnostic significance of the measure, since Symbol Digit is generally—but especially in the Schizophrenics—much better retained than Story Recall. Not only this practical consideration, but also the psychological nature of the *meaningless* character of Symbol Digit in contrast to the *meaningful* character of Story Recall militates against its inclusion in the Learning group. Its motor-speed character, as compared with the verbal character of the Recall subtests, is a further contra-indication against its inclusion. In the following discussion of Learning Efficiency Scores, we shall omit from the calculation the Symbol Digit subtest score.

TABLE 61.—*Average Scores on the Learning Subtests*

Group	No. of Cases	Average Learning Norm	Average Scores			
			(No 4 (I.R.)	No. 11 (D.R.)	No. 5 (S.D.)	No. 12 (P.A.)
Schizophrenics	42	14.9	11.7	11.6	13.9	11.1
Depressives	17	14.8	12.3	11.4	11.8	8.9
Neurotics	40	15.3	14.2	15.7	15.9	13.5
Patrol	54	15.1	14.5	16.4	16.3	13.4

The fourth subtest in the Learning group is a Paired-Associates test (No. 12). This subtest, it is true, has a learning character, since the procedure is the following: first seven pairs of words,[5] spaced in time, are read to the subject; the examiner then calls out the first word of each pair, and the subject is expected to reply with the second word. Whenever he gives an incorrect response, or gives no response in 10 seconds, the pair is repeated to him *as a pair*. The first trial on the 7 pairs is not scored. The second trial follows the same procedure: the examiner gives both words of the pair if a correct response is not given within 10 seconds. The second and third trials are scored: three units are credited for a correct response occurring within one second, 2 units for a correct response occurring within 2 seconds, and 1 unit for a correct response occurring within 10 seconds.

---

[5] earth—hole; cane—beat; lawn—cap; spark—tears; lion—wolf; twig—song; fun—coal.

The learning character of this subtest results from the examiner's repeating each pair failed by the subject immediately after the failure. However, the importance of speed and the nonsense-relationship between the pairs cloud the rôle played by memory organization and learning. As a result, the factors of attention and concentration occupy the foreground. The subtest is instructive, because it frequently shows how the search after meaningful connections between the words brings about false responses. In disorganized people, the responses will sometimes be of characteristic and revealing content. Otherwise, this is the most vulnerable subtest in the Learning group, because it can be disturbed by impaired attention and/or concentration, as well as by all those factors which encroach upon learning and memory discussed in connection with the Story Recall subtests.

In Table 61, inspection shows that Paired-Associates suffers much more in the Neurotic and Patrol groups than do the Story Recall subtests; but in the Schizophrenics, it is on about the same level. Thus, its inclusion in the Learning group tends to level out the difference between the Schizophrenics, on the one hand, and the Neurotics and Patrol, on the other. The inclusion of this subtest in the Learning group is therefore not only qualitatively disturbing to homogeneity but, practically, works against diagnostic differentiation that might be based on the scores of the Learning group. For this reason, we do not include, in our everyday work and in the results to follow, the Paired-Associates subtest score in the Learning group. Having eliminated Symbol Digit and Paired-Associates from the Learning group, we are left only with the two Story Recall subtests to measure Learning Efficiency.

3. *The Subtests of the Motor Group.* This group includes three subtests: the Symbol Digit subtest, already mentioned in the Learning group (subtest No. 5); the timed writing of the sentence, "I am going to get well very soon" (subtest No. 9); and the timed tracing of a simple maze (subtest No. 10).

Undoubtedly, all these three subtests require motor activity. It is noteworthy, however, that these motor activities are of quite varied character and none of them is simple.

The tracing of the maze includes not merely speed of motor action, but also motor control based on spatial orientation. Other factors may encroach upon motor speed in this subtest, especially a fear of touching or crossing the boundaries of the maze which compels the subject to draw slowly. This must be distinguished, as a sign of caution and anxiety, from slowness resulting from general motor retardation.

The writing of the sentence includes, on the one hand, habituated motor action dependent upon the background and life position of the subject, and, on the other hand, writing a sentence which is emotionally loaded for psychiatric patients and contrary to sense for normal subjects.

The Symbol-Digit subtest, as we have already stated, is more clearly a test of motor speed than the Digit Symbol subtest of the Bellevue Scale as it requires the writing of motor-habituated numbers (1 to 5). The speed factor can more easily come to the fore in Symbol Digit than in Sentence Writing, because of the disturbing emotional meaning of the sentence, as well as the greater motor complexity of continuous writing of words in contrast to the simple, isolated writing of habituated digits. Furthermore, the instructions do not mention speed in the case of Sentence Writing. Symbol Digit is more clearly a test of motor speed than the Maze Tracing, where spatial-motor action, control, and accuracy are crucial, and where excessive caution may result in a slow performance. But it should not be forgotten that learning still plays a rôle in the Symbol Digit subtest, that identification of the symbols is an added task, and that Symbol Digit thus does not provide a simple unambiguous speed measure.

TABLE 62.—*Average Scores on the Motor Subtests*

Group	MN	No. 5 (S.D.)	No. 9 (S.W.)	No. 10 (M.T.)
Schizophrenics	15.4	13.8	14.4	13.2
Depressives	15.2	11.8	13.8	10.9
Neurotics	15.9	15.9	15.5	13.4
Patrol	15.7	16.3	15.2	14.6

One would wish to have a very simple speed-of-tapping or similar test in the battery. Altogether, one would wish to standardize, and to explore as to vulnerability, a number of motor tests of well-graded degrees of motor complexity, such as speed-of-tapping, pegboard, etc. For the time being, we must remain satisfied with these three as our "motor" tests. Reasons for this will be clearly seen by inspection of Table 62.

This table gives the average Motor Norm and the average scores of our major groups of subjects on the three Motor subtests. It indicates that all these subtests are most vulnerable in the Depressive group, though Sentence Writing (No. 9) is much less vulnerable in this group than Symbol Digit (No. 5) and Maze Tracing (No. 10). Nevertheless, it does not seem advisable to exclude the Sentence Writing subtest from the Motor group, because it holds up well in the Neurotics and Normals; and although in the Schizophrenics it does not hold up so well, they are nevertheless more efficient on it than are the Depressives. Thus, until more systematic work with other motor tests has been done, it will be practical to keep these three subtests together; primarily, because they all show their greatest drop in the Depressive groups, where on clinical grounds we would expect motor tests to suffer from the effects of depressive retardation.

Having thus described the individual subtests of each of Babcock's three subtest groups, we came to the conclusion that the best measure of Repetition Efficiency could be derived from using only the Digit Span Forward and Digit Span Backward subtests; that the best measure of Learning Efficiency could be derived from using only Immediate and Delayed Story Recall subtests; and that the three subtests of the Motor group, although qualitatively not fortunate choices and quantitatively not providing unequivocal measures, should for the present be sufficient to give a measure of Motor Efficiency.

In spite of the lack of coherence in the groupings offered by Babcock, and in spite of our suggested modifications of these groupings, an inspection of Table 63 indicates that, as suggested by Babcock, a measure of Total Efficiency based on the average score on all nine subtests is clinically meaningful and diagnostically helpful. This table gives the average Total Efficiency Scores for our major clinical and control groups. It clearly shows that the Patrol has the least drop in efficiency, with the Neurotics following close on its heels. Next, with a greater loss of efficiency, come the Schizophrenics, followed at some distance by the Depressives with the greatest loss. This rather clearcut sequence, which follows so well the general distribution encountered in the scatter measures of the Bellevue Scale, should be a useful diagnostic indicator. More crucial, however, as we shall attempt to show, are the comparisons of the different Efficiency Scores on the three groups of subtests, which represent qualitative specific impairments.

TABLE 63.—*Average Total Efficiency Scores*

Group	No. of Cases	Average Total Efficiency Score
Schizophrenics	42	−2.2
Depressives	17	−2.8
Neurotics	40	−1.0
Patrol	54	−.6

D. THE TECHNIQUE OF ADMINISTRATION

In this section we shall outline some special techniques of administration which we have found essential for a proper evaluation of the subject's achievements and for a meaningful diagnosis. As on the Bellevue Scale, we followed rather closely the standard instructions for administration. However, here too, we have put into practice some *supplementary* techniques suggested by experience.

Immediate (No. 4) and Delayed (No. 11) Story Recall: On these two subtests it is essential that the subject's recall should be recorded verbatim. On the Stanford-Binet this technique is not provided for, as the story is written out on the blank and the examiner in one way or another checks off the correct memories offered by the subject. Such a recording technique neglects almost completely the significance of the quality of memory performance, since the exact verbalizations of the subject, the exact sequence of memories, the fragmentary memories, the introduction of bizarre material, and so on, are not recorded. We have found a consideration of these features of recall necessary for correct and meaningful interpretation of the subject's performance. The verbatim recording which we consistently follow allows for an evaluation of the extent to which the structure of the story and the sequence of ideas with cause-effect relationships were retained. It is important to follow Babcock's instructions here: after the Immediate Recall is given, one does not at once re-read the story, but rather tells the subject that later he will be asked how much of the story he still remembers; a pause of a few seconds before re-reading the story is necessary to allow him to crystallize the retained memories and to re-emphasize to himself significant omissions. It is true that such a technique offers a special advantage to normal subjects, who in general are able to take advantage of this opportunity and who therefore derive maximum benefit from the re-reading; but this is the essential reason for following this technique: it is always the normals or the well-preserved neurotics who are able to benefit from it, and the more disorganized, psychotic or near-psychotic patients who cannot. In other words, this technique results in a sharper differentiation of organized and disorganized memory functioning.

The Symbol Digit Subtest (No. 5): On this subtest the important technique is to record the time required to fill out each of the five lines of symbols. Such a breakdown of the timing, though crude, allows for some estimate of the factor of fatigue in the slowing down of the progressive achievements of the subject. It allows also for some estimate of the variability of rhythm or tempo in the subject; and we shall attempt to show later in the statistical section that very uneven rhythm—in other words, great differences in the time required to fill out each line of symbols—may become a diagnostic indicator. As on the Bellevue Scale, we emphasize to the subject that he must fill in the lines continuously from left to right and from top to bottom; so that if the subject chooses to fill in first all the symbols of one kind, and then all of another kind, he cannot attribute this procedure to vague instructions.

Digit Span Forward (No. 6) and Digit Span Backward (No. 7): The administration of Digit Span subtests has been discussed in detail in connection with Digit Span on the Bellevue Scale; we refer the reader to that discussion.

Sentence Writing (No. 9): In accordance with Babcock's instructions, we do not tell the subject to write the sentence as fast as he can, but rather allow him to follow his own preferred speed. However, this results in a serious disadvantage. Not infrequently a subject who shows no signs of motor retardation, and who otherwise performs easily and efficiently, when allowed to follow his preferred speed, will write the sentence neatly, perhaps elegantly, and carefully; so that his performance time is not representative of his motor speed, and the low score obtained is invalid as an indicator of motor retardation. If the examiner notes that an otherwise efficient subject is writing slowly and carefully on this subtest, he should re-administer it, asking the subject to write with not so much care for neatness and precision. Such subjects thereupon will in general write much more quickly, confirming the examiner's impression that there is no essential motor retardation present. The examiner should note carefully any signs of hesitation between or during the writing of words, any tendency to check back, any evidence that in the course of writing the subject has lost the feel for the structure of the sentence and is in doubt as to how it should end, and so on. Especially should the examiner note any signs of emotional reaction to the meaning of the sentence. Such emotional reactions may serve not only to slow down the writing, but may also account for omission of words such as "very" or preoccupied pauses during the writing of the sentence.

Maze Tracing (No. 10): The proper administration of this subtest is complicated by two opposing emphases in the instruction. On the one hand, the subject is told to draw a line without touching either of the walls of the maze; and on the other hand, he is told to do this as quickly as he can without stopping. It is not surprising that there are individual variations in the relative weight given to these two instructions. The proper interpretation, of course, is to draw as quickly as is consistent with accurate, controlled drawing. However, some subjects feel that speed is the essential thing, even though their haste may result in touching or crossing the walls of the maze. More frequently, subjects will give greater emphasis to accuracy, and as a result will draw their line slowly, carefully, and as near to the center of the distance between the walls as possible. Such excessive caution must be distinguished by the examiner from motor retardation. We have found that the best way of making this distinction is to give the subject another trial, with the added instruction to be less cautious and to do it really as fast as he can. In general, the cautious subjects will then trace the maze quickly and efficiently, while the essentially motor-retarded subjects will show little change in speed.

Paired-Associates (No. 12): We found it helpful to record the subject's incorrect associations to the stimulus word given by the examiner. Disorganized subjects sometimes give a revealing association to the stimulus word, as though it were a word-association test. Such performances also may reveal the subject's misinterpretation of the task, and the corresponding amount of disorganization of thought processes present. Sometimes, because of the nonsensical relationship between the words of the pair, the subject will give the second word of one pair to the first word of another pair; such incorrect associations are to be distinguished from the meaningful associations. Consequently, we believe it is essential to record every incorrect association given by a subject. The exact time required by the subject to give the association should also be recorded. This is especially true for those associations which take from 2 to 10 seconds; although all such associations, whether 2 *or* 10 seconds, get one credit, there is a qualitative difference implied in varying speeds of association. The exact time is an indicator of this difference.

Sentence Repetition (No. 19): On this subtest we found it essential to record all striking deviations from the original sentence present in the subject's recall. Any introduction of new material, any confusion between the parts of the sentence, any basic change in the meaning of the sentence, is an indicator of considerable disorganization of immediate memory; and the examiner must have a verbatim record of these distortions in order to evaluate the severity of the disorganization. Difficulties of recall—such as pausing to search for a missing word, with the implication that the structure of the sentence is nevertheless retained—should be noted, to distinguish such performances from the more disorganized performances where the sentence is blithely repeated with glaring omissions.

E. STATISTICAL RESULTS[6]

1. The Average Vocabulary Age of our Clinical and Control Groups. We did not undertake a detailed analysis of Vocabulary achievement on the Babcock Test, as we have done so already on the Vocabulary subtest of the Bellevue Scale. However, before proceeding to a discussion of the results of the Efficiency Scores on the Babcock Test, some discussion of the average Vocabulary Age in the various groups is necessary.

---

[6] The number of cases of our entire research population who took the Babcock Test is considerably less than the number who took the Bellevue Scale. Some groups, such as the Psychotic and Involutional Depressives, were small enough to begin with, and consequently had only a few cases with Babcock Test results. Our statistics concerning these groups, though generally clear-cut and understandable in terms of the dynamics and symptoms of the groups, are nevertheless precarious in significance. Because of this great reduction in the number of our cases, we were frequently obliged to avoid subgroup comparisons in favor of major group comparisons—providing that the subgroups comprising a given major group showed some consistency of pattern in performance.

The third column of Table 64 represents the average Vocabulary Age for each of our 22 groups. Four groups stand out with the lowest average Vocabulary Age: the Deteriorated Unclassified Schizophrenics, the Neurasthenics, the Severe Neurotic Depressives, and the Simple Schizophrenics, in sequence of impairment. These are the groups which showed a low average Vocabulary score on the Bellevue Scale.[7]

TABLE 64.—*Average Efficiency Scores*

Group	No. of Cases	Av. Voc. Age	Av. T.D.	Av. L.D.*	Av. M.D.	Av. R.D.*
U Sch A	9	16.2	−2.1	−3.3 (−2.4)	−1.7	−.3 (+.5)
U Sch Ch	10	16.2	−2.1	−2.5 (−2.4)	−1.2	−1.7 (−1.0)
U Sch D	4	12.2	−3.9	−4.2 (−3.9)	−2.2	−3.1 (−3.2)
P Sch A	8	16.6	−2.5	−2.6 (−2.2)	−1.2	−2.6 (−1.6)
P Sch Ch	8	15.9	−1.5	−2.6 (−2.4)	−.6	−.6 (+.1)
P Sch D	3	15.8	−1.6	−2.2 (−.3)	+.1	−2.0 (−.8)
P Co	11	17.5	−1.2	+.6 (−.2)	−1.0	−1.9 (−1.1)
S Sch	4	15.0	−.5	+1.1 (+1.6)	−1.0	+.7 (+.8)
Pr C	12	16.8	−.9	−.4 (−.3)	−1.3	−.5 (.4)
Pr OI	11	17.6	+.5	+1.6 (+1.3)	−.1	+.8 (+1.1)
DP	2	16.0	−5.2	−7.8 (−8.4)	−3.6	−2.7 (−1.8)
DI	3	16.3	−4.3	−3.4 (−5.5)	−4.9	−2.8 (−1.4)
DSN	8	14.9	−1.9	−1.7 (−2.1)	−2.0	−.3 (+.5)
DN	4	16.0	−2.4	−1.1 (−1.6)	−2.8	−3.4 (−1.0)
Hy	12	16.9	−.7	0 (+.4)	−.4	−1.8 (−.4)
A & D	8	17.2	−1.8	−1.7 (−1.6)	−1.4	−1.9 (−.9)
MN	7	16.9	−.6	+1.0 (+.2)	−.7	−.9 (−.6)
O-C	9	17.7	−.8	−.6 (+.2)	−1.1	−1.2 (−.1)
Neuras	4	14.0	−1.9	−1.9 (−2.6)	+.3	−1.4 (−.1)
P (1)	32	16.6	−.7	+.1 (0)	−.4	−1.3 (−.3)
P (2)	17	15.8	−.5	+.9 (+.1)	+.1	−1.0 (+.2)
P (3)	5	16.0	0	+1.3 (+1.3)	+.3	−1.2 (−.3)

* The numbers in parentheses are the averages based on Babcock's method of computing L.D. and R.D.

---

[7] The Psychotic Depressives do not show the impairment on the Babcock Vocabulary that they did on the Bellevue Vocabulary. This is largely due to the fact that only two Psychotic Depressives took the Babcock test, and even on the Bellevue these two stood out from the others with a high Vocabulary score.

These averages indicate that the Vocabulary achievement is not altogether refractory to impairment by maladjustment, and that certain groups may even be severely impaired. Schizophrenic deterioration, the longstanding withdrawal and lack of interest of the Simple Schizophrenics, severe depression, and the depressive-like sluggishness of the Neurasthenics, all impair Vocabulary efficiency.

As on the Bellevue Scale, the four groups with the highest average Vocabulary achievements are the Over-Ideational Preschizophrenics, the Obsessive-Compulsives, the Paranoid Conditions, and the Anxiety and Depression group. These groups we have described as characterized by excessive intellectualization and a strong striving toward cultural attainment. This rather good correlation between achievements on the Bellevue and on the Babcock Vocabulary subtests, in terms of group averages, indicates that the modifications of interpretation of scatter pattern made on the Bellevue Scale should be made also on the Babcock Test. Thus on the one hand, in certain groups, characterized by a low Vacabulary level, the absence of great negative Efficiency Scores should not be taken to indicate good efficiency; rather, the results of those groups are inconclusive, since the Vocabulary level no longer functions as a good standard from which to estimate impairment or inefficiency. On the other hand, in those groups characterized by extremely high Vocabulary scores, the presence of great negative Efficiency Scores does not indicate that their efficiency is extremely impaired relative to the general population. As a matter of fact, their achievements may be better than those of the general population. But in terms of the Efficiency level on which they should be functioning, as indicated by their Vocabulary scores, they do show significant impairment.

2. The Statistical Evaluation of the Total Efficiency (*T.D.*).[8] The Total Efficiency Score is obtained by averaging the 9 Babcock subtest scores, and subtracting from them the Total Norm corresponding to the Vocabulary Age of the subject. Although the Total Efficiency Score (T.D.) is rarely in itself diagnostic, we shall present a brief analysis here of Total Efficiency patterns in our various groups in order to demonstrate that T.D. is sensitive as a gross differentiating measure between clinical groups.

Figure 21 represents the average T.D. for each of our 22 clinical and control groups, and Figure 22 represents the averages for the major combined groups. In Figure 22 especially the diagnostic significance of T.D. is expressed. The most generally impaired group is the combined Psychotic and Involutional Depressive group, which is far worse than all the others. Next in severity of general impairment come the Schizophrenics and the Depressive Neurotics, followed closely by the depressive-like Neurotic groups (Anxiety and Depression group, and Neurasthenics). The best groups of all are the relatively efficient Neurotic groups (Obsessive-Compulsive,

---

[8] T.D. stands for Total Deterioration Score in Babcock's terminology.

Hysteric, and Mixed Neurotic) and the Patrol. Most striking in this graph is how sharply differentiated the Depressive Psychotics are from the Depressive Neurotics and the depressive-like Neurotics. In other words, where impairment of efficiency appears to be generalized, it is likely to be the consequence of the presence of depressive trends; and the severity of these depressive trends may be estimated by the magnitude of the negative T.D. Although the Schizophrenics also have a rather significant average negative T.D., we shall see in the course of our analysis that this low efficiency is characteristically associated with some better retained achievements, while in the Depressives the inefficiency is rather general and uniform. We have already seen this type of differentiation between Depressives and Schizophrenics to hold true on the Bellevue Scale, and especially in connection with the Performance subtests.

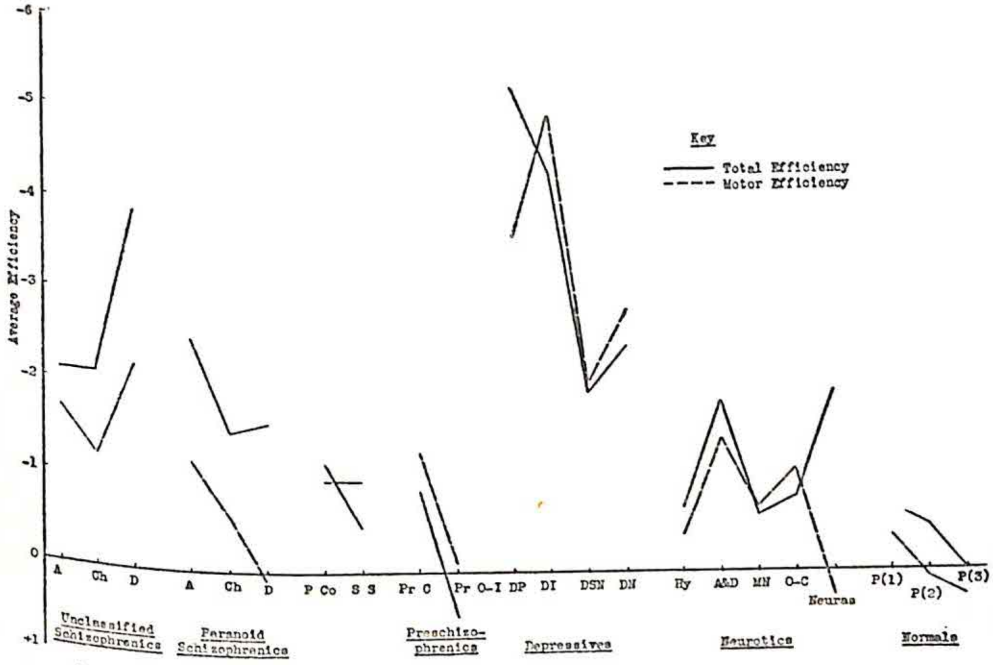


FIG 21.—BABCOCK TEST: TOTAL EFFICIENCY AND MOTOR EFFICIENCY
Group Averages

If we examine Figure 21, representing the breakdown of the major groups, some special trends are apparent. In the Unclassified Schizophrenics, the factor of deterioration encroaches most sharply upon Total Efficiency; while in the Paranoid Schizophrenics, the factor of acuteness encroaches most. This difference between the Unclassified and Paranoid Schizophrenics was also apparent, though not so sharply in the results on the Bellevue Scale, and especially on the Performance subtests.

Aside from the Patrol, the two groups with the smallest negative T.D. are the Simple Schizophrenics and the Over-Ideational Preschizophrenics. The Simple Schizophrenics have such a small negative T.D. mainly as a consequence of their impaired Vocabulary, which on this test—as on the Bellevue Scale—is the medium of comparison. The Over-Ideational Preschizophrenics—who, as a matter of fact, have a slightly positive T.D.—show up so well because their Total Efficiency is rather well-

TABLE 65.—*Significance of Average Efficiency Scores*

Group	No. of Cases	T.D.		
		M	σM	Significance
(P + U) Sch	42	−2.2	.28	<<1%
DP + DI	5	−4.7	.40	<<1%
DSN + DN	12	−2.1	.64	<1%
OC + Hy + MN	28	−.7	.32	2–5%
A & D + Neuras	12	−1.8	.64	1–2%
Patrol	54	−.6	.19	<1%
P Co	11	−1.2	.47	2–5%
		L.D. (revised)		
		M	σM	Significance
(P + U) Sch	42	−2.9	.50	<<1%
DP + DI	5	−5.2	1.27	1–2%
DSN + DN	12	−1.5	1.14	20–30%
OC + Hy + MN	28	+.1	.40	80%
A & D + Neuras	12	−1.8	.77	2–5%
Patrol	54	+.5	.29	5–10%
Pr OI	11	+1.6	.70	2–5%
		M.D.		
		M	σM	Significance
(P + U) Sch	42	−1.2	.31	<1%
DP + DI	5	−4.4	.78	<1%
DSN + DN	12	−2.3	.63	<1%
O-C	9	−1.1	.88	20–30%
A & D	8	−1.4	.88	10–20%
		R.D. (revised)		
		M	σM	Significance
Total Neurotics	40	−1.5	.47	<1%
Patrol	54	−1.2	.42	<1%
U Sch A	9	−.3		
U Sch Ch	10	−1.7		
U Sch D	4	−3.1		
P Sch A	8	−2.6		
P Sch Ch	8	−.6		
P Sch D	3	−2.0		
DP	2	−2.7		
DI	3	−2.8		
DSN	8	−.3		
DN	4	−3.4		

retained. This was not quite so true for their Performance subtest achievements on the Bellevue Scale, but even there their scores were hardly ever extremely low.

Table 65 presents, among others, the average T.D. and its significance of difference from zero for the major combined clinical and Patrol groups. We see here again that the general trend of inefficiency in the Depressive Psychotics is the greatest and the most significant. The significance of the impaired efficiency in the Schizophrenics is clearer on this table than on the graph, since the average is almost identical with that for the Depressive Neurotics. The greater significance of the impairment in the Schizophrenics is an indication of the fact that the impairment is much more consistent in them than in the Depressive Neurotics. The Depressive Neurotics show the third greatest general impairment of Efficiency. They are followed by the two depressive-like Neurotic groups (Anxiety and Depression, and Neurasthenia), and then by the remaining Neurotic groups and the Patrol. It is significant that the Patrol, though its average impairment is only −.6, shows a significance below the

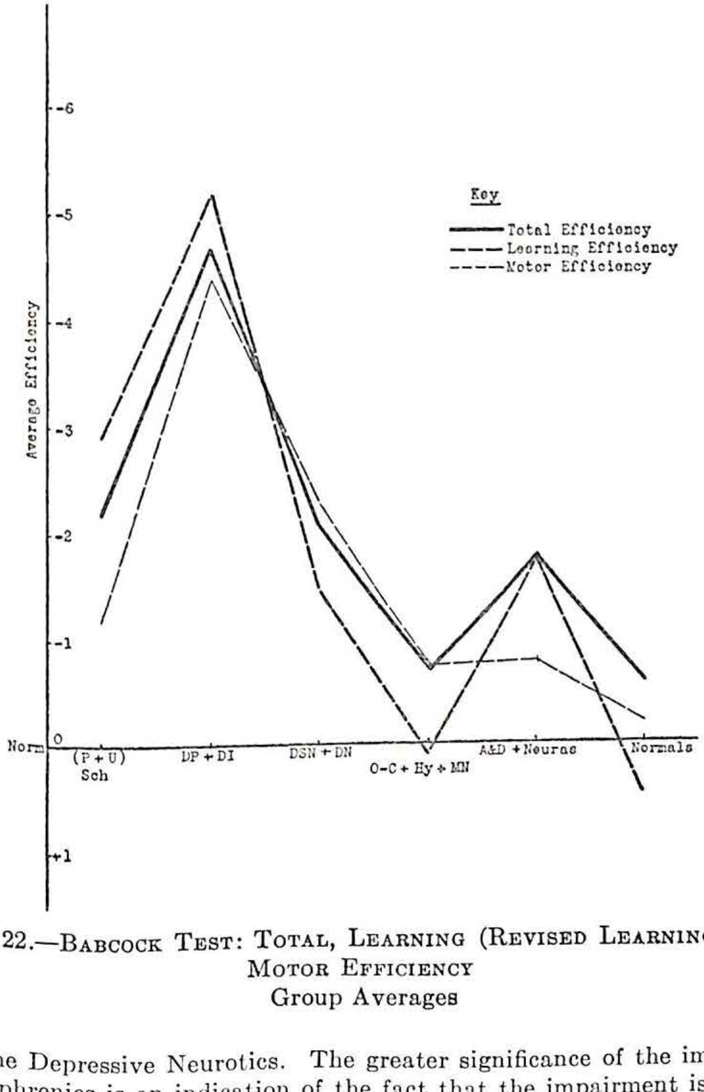


FIG. 22.—BABCOCK TEST: TOTAL, LEARNING (REVISED LEARNING), AND MOTOR EFFICIENCY
Group Averages

1% level; this indicates that a negative Efficiency Score between zero and −1 should be considered "fair" and within the "normal" range.

Table 66-A presents the analysis of the distribution of Total Efficiency scores in our major groups into three ranges of Efficiency. Here we see that 100% of the Depressive Psychotics have extreme general impairment. Although the group is small, this percentage is a strong indication that one should expect a generalized impairment of Efficiency in Depressive Psychotics. On the other hand, only 4% (or two cases) of the Patrol have such extreme generalized impairment. This finding indicates that where a generalized impairment of extreme degree is present, there is almost definitely some severe maladjustment beyond the limits of normal impairment. The Patrol, of course, is most highly represented in the most efficient range (greater than or equal to −1).

TABLE 66-A.—*Percentage of Cases in Ranges of Total Efficiency (T.D.)*

Group	No. of Cases	Percentage of Cases		
		<-3	<-1	$\geqq -1$
(P + U) Sch	42	31	40	29
DP + DI	5	100	—	—
DSN + DN	12	50	17	33
Neurotics	40	18	32	50
Patrol	54	4	37	59

TABLE 66-B.—*Differential Significance of Distributions of Cases*

Groups Compared	Chi^2 (d.f. = 2)	Significance
(P + U) Sch : (DP + DI)	6.33*	1–2%
(P + U) Sch : (DSN + DN)	2.52	20–30%
(P + U) Sch : Neurotics	4.34	10–20%
(P + U) Sch : Patrol	15.95	<<1%
(DP + DI) : (DSN + DN)	1.98*	10–20%
(DP + DI) : Neurotics	11.54*	<<1%
(DP + DI) : Patrol	31.90*	<<<1%
(DSN + DN) : Neurotics	5.27	5–10%
(DSN + DN) : Patrol	19.01	<<<1%
Neurotics : Patrol	5.13	5–10%

* A 2 x 2 comparison was made because the small number of cases in (DP + DI) massed in the lowest range; categories were "<−3", "not <−3"; d.f. = 1.

Table 66-B presents the differential significance of these distributions showing that the Depressive Psychotics are significantly differentiated from all other groups except the Depressive Neurotics, from whom the differentiation is only a trend. This result is attributable to the small number of cases in both groups. If we refer back to Table 66-A, we see that only 50% of the Depressive Neurotics are in the extremely inefficient range, and in all likelihood a greater number of cases in both groups would follow the same distribution. 33% of the Depressive Neurotics have negligible negative Efficiency Scores; this would be most unusual in a Depressive Psychotic. The Neurotics and the Patrol are in general significantly more efficient than the other clinical groups, and the Patrol shows a trend to be more efficient than the Neurotics.

We conclude that (a) a great negative Total Efficiency Score is most indicative of a Depressive Psychosis, and to a lesser extent of a Depressive Neurosis or some kind of Schizophrenia; (b) the extremely small representation of the Normal group in the great negative Efficiency Score range, in contrast to the Neurotics, indicates that an impairment of Total Efficiency bespeaks some severe maladjustment beyond the limits of what is called "normal".

3. The Statistical Evaluation of the Repetition Subtests.[9] Before presenting our analysis of Repetition Efficiency we must first offer statistical evidence to support the modifications we introduced in calculating it, as our analysis uses the modified measures.

Table 64 presents the average Repetition Efficiency for all our groups, calculated in both the original and the modified way. If we consider especially the averages of the Neurotic groups, it becomes immediately apparent that the modified Repetition Efficiency measure brings forth much more clearly the tendency in the Neurotics for Repetition Efficiency—attention—to be impaired. In our analysis of the Bellevue Scale, we saw that the Neurotics in general show a specific and severe impairment on Digit Span; this impairment is obscured by calculations based on Babcock's original method, but is brought to expression by the modified method. Most of the other groups also show an increasing impairment of Repetition Efficiency when the modified measure is used; but we feel that the trend in the Neurotics should not be sacrificed by retaining the old measure.

Figure 23 presents the percentage distribution of cases into three ranges of Repetition Efficiency, calculated in both the original and the modified way. Here we find these same trends even more strongly present. The graph presents percentages for four major groups: the Schizophrenics, the Depressives, the Neurotics, and the Patrol. If we look at the percentages for the Neurotic group we see that a rather dramatic reversal of percentages has taken place. According to the old measure, the percentage of Neurotic cases with a good Repetition Efficiency exceeds the percentage of Neurotic cases with a very poor Efficiency, and exceeds also the percentage of cases of all groups with good Repetition Efficiency. According to the new measure, these percentages are changed, and the prevalence of Neurotic cases with poor Repetition Efficiency is apparent. These considerations hold true for the Patrol group also, which, as we have seen, contains a considerable number of anxious cases and a consequent wide-spread impairment of attention. Furthermore, according to the modified measure, it is not the Neurotics who have the highest percentage of cases with good Repetition Efficiency, but rather the Schizophrenics. This tendency in the Schizophrenics, revealed by the modified method, is of importance because it indicates their tendency to have a well-retained Digit Span score.

---

[9] Babcock's Repetition Efficiency Score (RD) is obtained by averaging the scores of the 6th, 7th, and 19th subtests, and subtracting from the average the Repetition Norm corresponding to the Vocabulary Age of the subject. Our modified RD omits, in calculating the average, the score of the 19th subtest.

Table 67 presents the percentage distribution represented in Figure 23 and shows the magnitude of the changes. While the Neurotics previously had 48% of their cases with excellent Repetition Efficiency, they now have only 30%; while the Neurotics only had 33% of their cases with Repetition Efficiency scores "less than −2", they now have 46%. The Patrol previously had 28% "less than −2" and now has 42%.

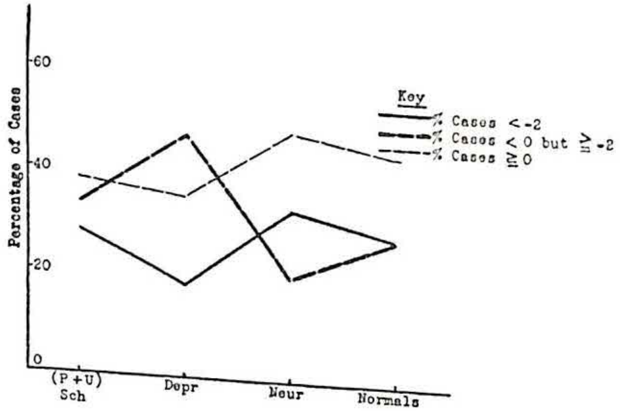


FIG. 23-A.—BABCOCK TEST: ORIGINAL REPETITION EFFICIENCY SCORES
Percentage of Cases in Three Ranges of Efficiency

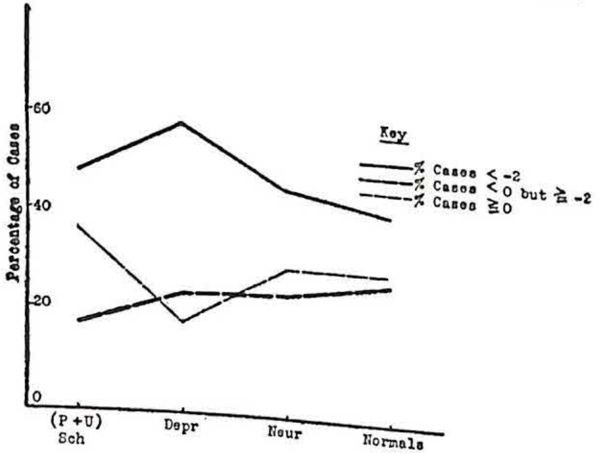


FIG. 23-B.—BABCOCK TEST: REVISED REPETITION EFFICIENCY SCORES
Percentage of Cases in Three Ranges of Efficiency

In the Patrol breakdown into Anxious and Non-Anxious cases, the greater diagnostic value of the modified method is even more evident. Using the old measure, 36% of the Anxious Patrol had repetition efficiency scores from −2 to −5, and none below −5; using the modified measure, 42% of the Anxious Patrol have efficiency scores from −2 to −5, and 11% below −5. We have repeatedly stressed that impairment of Repetition Efficiency as tested by Digit Span is an indicator of interference of anxiety with attention; and as we find that the modified measure of Repetition Efficiency brings out the greater impairments associated with anxiety, even within the normal range, we believe this to be additional statistical justification for our modification. Accordingly the following statistical analysis will be based on the Repetition Efficiency scores calculated from only the two Digit Span subtests, without the Sentence Repetition subtest.

Let us turn our attention to Table 65, which presents the significance of the difference of the average Efficiency Scores from zero. The only two groups that were tested were the Neurotics and Patrol; both show only a mild negative average Efficiency Score, but each of these is significant. In other words, there is a consistent tendency in both the Neurotics and the Patrol to have a somewhat impaired Repetition Efficiency. These results support those obtained on the Bellevue Scale.

TABLE 67-A.—*Percentage of Cases in Ranges of Repetition Efficiency*

Babcock's Method						Revised Method					
Group	No. of Cases	Percentage of Cases				Group	No. of Cases	Percentage of Cases			
		< −5	< −2	< 0	≥ 0			< −5	< −2	< 0	≥ 0
(P + U) Sch	42	2	26	33	38	(P + U) Sch	42	19	29	17	36
Pr C	12	—	17	33	50	Pr C	12	8	42	8	42
Pr O-I	11	—	—	36	64	Pr O-I	11	—	27	18	55
Depr	17	—	18	47	35	Depr	17	—	59	24	18
Neurotics	40	5	28	20	48	Neurotics	40	8	38	25	30
Patrol	54	—	28	28	44	Patrol	54	11	31	28	30
Patrol Anx	36	—	36	31	33	Patrol Anx	36	11	42	19	28
Patrol Non Anx	18	—	22	11	67	Patrol Non Anx	18	11	11	44	33
						Patrol Sch	12	—	25	42	33
						Patrol Non Sch	42	16	33	24	29
						Patrol Anx, Non Sch	27	15	48	15	22
						Patrol Anx, Sch	9	—	22	33	44
						Patrol Non Anx, Non Sch	15	7	13	40	40

We will not go into detailed analysis of the other average Repetition Efficiency Scores, since we have already done so on the Bellevue Scale, and the results here appear to be consistent with those. Especially is this true for the Acute Unclassified Schizophrenics, who, because of their tendency to have a well retained Digit Span score, show almost no negative Efficiency average. The two Depressive Psychotic groups and the Deteriorated Unclassified Schizophrenics show—as on the Bellevue Scale—great negative Efficiency on the Repetition subtests. It is surprising that the Neurotic Depressives have such a great negative Efficiency—a finding which was not clear-cut on the Bellevue Scale—while the Severe Neurotic Depressives have almost no negative Efficiency on the Repetition subtests. This may be partly accounted for by their poor Vocabulary.

To avoid too much duplication of the Digit Span results on the Bellevue Scale, we shall forego further discussion of the averages and turn to the inter-group differences of distribution into ranges of Efficiency. Table 67-A presents the percentage distribution of cases into four ranges of Repetition Efficiency, and Table 67-B presents the differential significance of the distributions. The Schizophrenic group, as a whole is significantly different only from the Depressives. This difference is principally in the best Efficiency range (greater than or equal to 0). As the Schizophrenics are highly represented in all 4 ranges of Efficiency, they cannot differ significantly from any of the other groups.

The Depressives are not at all differentiated from the Neurotics; they show a mild trend to be differentiated from the Patrol, and a stronger trend to be differentiated from the Patrol when the Anxious cases are excluded. The Neurotics show only a trend to be different from the Patrol with the Anxious cases excluded.

TABLE 67-B.—*Differential Significance of Distribution of Cases*
(Revised Repetition Efficiency Scores)

Groups Compared	Chi^2 (d.f. = 3)	Significance
(P + U) Sch : Depr	7.86	5%
(P + U) Sch : Neurotics	3.47	30–50%
(P + U) Sch : Patrol	2.62	30–50%
(P + U) Sch : Patrol Non Anx	2.41*	10–20%
(P + U) Sch : Pr O-I	1.21*	20–30%
Depr : Neurotics	3.20	30–50%
Depr : Patrol	5.05	10–20%
Depr : Patrol Non Anx	3.47*	5–10%
Neurotic : Patrol	.59	90%
Neurotic : Patrol Non Anx	1.85*	10–20%
Patrol Anx : Patrol Non Anx	3.42**	5–10%
Patrol Sch : Patrol Non Sch	1.14**	20–30%
Patrol Anx, Non Sch : Patrol Non Anx, Non Sch	5.52**	1–2%
Patrol Anx, Non Sch : Patrol Anx, Sch	3.01**	5–10%

* For these tests the 2 lower categories were combined, changing d.f. to 2.

** For these tests the 2 lower categories combined were compared to the 2 higher categories combined, changing d.f. to 1.

We see then that the Repetition Efficiency score is hardly effective in differentiating our groups. We had the same difficulty on the Bellevue Scale; this is consistent with impaired Repetition Efficiency appearing to be associated with anxiety, and with the considerable anxiety present in all of the clinical and even the Patrol groups.

The Chi² test of the differences of distribution among the Patrol breakdown groups is more illuminating. Consistent with the findings on the Bellevue Scale, the Anxious

Patrol shows a strong tendency approaching significance to be more inefficient than the Non-Anxious Patrol; and if the Schizoid cases which tend to do better than the Non-Schizoid cases on Repetition are excluded from the Patrol, the difference between Anxious and Non-Anxious cases becomes significant. Thus, anxiety is again demonstrated as a potent factor making for impaired Repetition Efficiency. The importance of the Schizoid factor in keeping up Repetition Efficiency is shown by the fact that those Patrol cases who are both Anxious and Schizoid show a strong tendency to be more efficient than those who are Anxious but not Schizoid. Thus in Normals, as in the Acute Unclassified and other Schizophrenic groups, schizoid trends tend to make for a good Repetition Efficiency. In the section on Digit Span in the Bellevue Scale, we attempted to offer a rationale for these findings.

Since these results on Repetition Efficiency in the Babcock Test are grossly parallel to the results on Digit Span in the Bellevue Scale, the reader may well question why duplication was necessary. The consistency of these findings is, however, in itself significant; and the specific value of retaining the Repetition Efficiency score of the Babcock Test will become clear in relation to the results on Learning Efficiency.

We conclude that (a) as on the Bellevue Scale, Repetition Efficiency as measured by Digit Span subtests appears to be impaired by the presence of anxiety. (b) Repetition Efficiency appears to be most impaired in the Deteriorated Unclassified Schizophrenics and the Depressives, somewhat less in the Neurotics and Anxious Normal group, and hardly at all in the Non-Anxious Normals. (c) Schizophrenic disorders as well as Schizoid trends have a tendency to bolster the Repetition Efficiency, this being especially true for the Acute Unclassified Schizophrenics, the Simple Schizophrenics, the Preschizophrenics, and the Schizoid Normals. In brief, impaired Repetition Efficiency appears to be associated with the presence of anxiety; while a good Repetition Efficiency appears to be associated either with a non-anxious normal adjustment, or with more or less pathological schizoid factors.

4. *The Statistical Evaluation of the Learning Subtests.*

(a) The Efficiency Score (LD).[10] The reader will remember that we retained as Learning subtests only the Immediate and Delayed Story Recall (No. 4 and No. 11), and excluded Symbol Digit (No. 5) and Paired-Associates (No. 12). Thus, in obtaining the modified LD we omit in the computation the scores of these two subtests. Inasmuch as the statistics on Learning Efficiency are based on this modification, we shall first attempt to show that it is justified by its increasing the differential diagnostic potency of the Learning Efficiency Score.

---

[10] Babcock's Learning Efficiency score (LD) is computed by averaging the scores of subtests 4, 5 11, and 12, and subtracting from their average the Learning Norm corresponding to the Vocabulary Age of the subject.

Table 64 presents the average LD for all our clinical and control groups. In the scores of the Schizophrenics, we see that their inefficiency of learning comes to clearer expression with the modified Learning Efficiency Score. In some Schizophrenic groups this increase is great, in others small, but it is present for all of the Unclassified and Paranoid Schizophrenic groups. In contrast, the Learning Efficiency Score is somewhat better for all the Depressive groups; it shows no consistent change in the Neurotic groups, and in the 3 Normal groups remains as good or becomes better. In other words, the introduction of the modification in the calculation of the Learning Efficiency Score emphasizes inefficiency of memory functioning only for the Schizophrenics, and it either improves, or does not affect, the Learning Efficiency Scores of the other groups.

For a graphical comparison of the old and new LD, let us turn now to Figure 24, which presents the percentage distribution of cases into three ranges of Learning Efficiency for the following major clinical groups: the Schizophrenics, the Depressive Psychotics, the Depressive Neurotics, the more efficient Neurotic groups (Hysterics, Obsessive-Compulsives, and Mixed Neurotics), the depressive-like Neurotic groups (Anxiety and Depression group and Neurasthenics), and the Patrol. If we consider the graphlines representing the percentage of cases with great negative LD, we find that upon substituting the new LD for the old only in the Schizophrenic groups is there any noticeable increase of this percentage; in all the other groups there is a greater or lesser decrease of percentages in this "inefficient" range. Furthermore only in the Schizophrenic groups is there any sizeable reduction of the percentage of cases with good LD scores.

The trends represented graphically in Figure 24 are presented statistically in Table 68-A, which compares the percentage distribution of cases into four ranges of Learning Efficiency, both in terms of the original method of calculation and the modified method. In these tables the principal changes appear to be that the Schizophrenics obtain a higher representation in the poor Efficiency ranges, while the Neurotics and the Normals obtain a higher representation in the good Efficiency ranges; this again attests to the greater diagnostic potency of the modified Learning Efficiency for Schizophrenia.

These differences appear to be small, and will show up as more significant when later in this section we shall consider the combined diagnostic advantage of both the modified RD and the modified LD. For the present, these differences offer sufficient justification for the use of the modified LD; and our computation of the significance of differences in distribution of cases into ranges of Learning Efficiency will be based on it.

Figure 22 presents the average LD for the major combined clinical groups, and indicates that the greatest impairment of Learning Efficiency occurs in the Depressive Psychotics. These are far worse than all the other groups; next worse are the Schizophrenics, then the Depressive Neurotics and the depressive-like Neurotic groups; best of all are the more efficient Neurotic groups and the Patrol. This hierarchy is roughly parallel to the hierarchy of impairment of general efficiency (TD).

Table 65 presents these average LD's for the major groups together with the significance of their deviation from zero. The impaired Learning Efficiency of the Depressive Psychotics appears to be less significant than that of the Schizophrenics, who however have a smaller negative average LD. This difference in significances is a statistical artifact, resulting from the very small number of cases in the Depressive Psychotic group; as we shall soon see, all the cases have great or extremely great impairments of Learning Efficiency. At any rate, it is the Depressive Psychotics

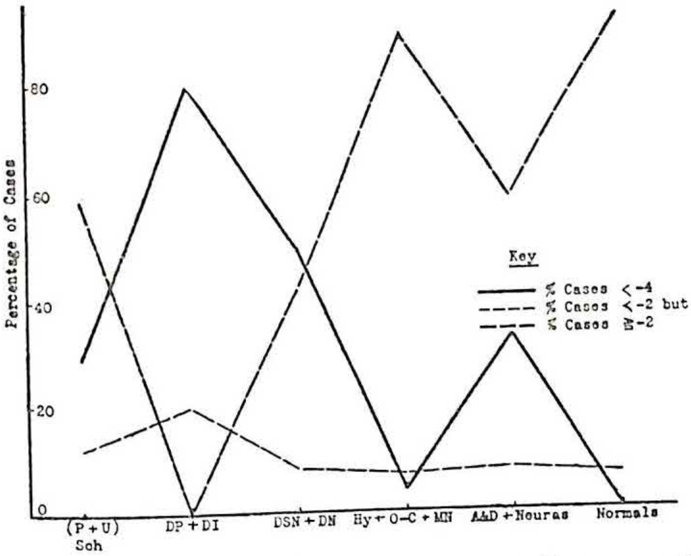


FIG. 24-A.—BABCOCK TEST: ORIGINAL LEARNING EFFICIENCY SCORES
Percentage of Cases in Three Ranges of Efficiency

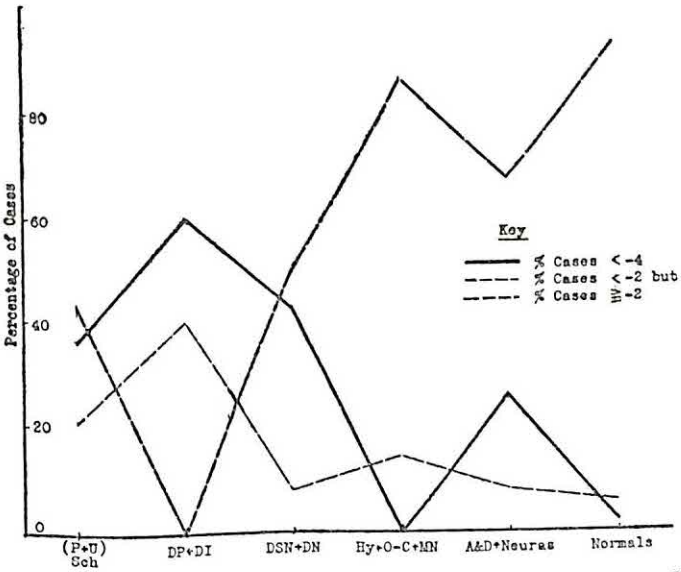


FIG. 24-B.—BABCOCK TEST: REVISED LEARNING EFFICIENCY SCORES
Percentage of Cases in Three Ranges of Efficiency

and the Schizophrenics who have the greatest and most significant drop of Learning Efficiency. These are followed by the depressive-like Neurotic groups, who appear to be more consistently worse than even the Depressive Neurotics; the latter show no significant tendency to have impaired Learning Efficiency. The Patrol stands out with its *positive* average Learning Efficiency, which appears to be consistent enough from case to case to result in a strong trend toward significance of the difference above zero. Most striking of all is the significantly superior Learning Efficiency of the Over-Ideational Preschizophrenics.

Tables 68 present the statistical analysis of these group trends in terms of the distribution of the percentage of cases into 4 ranges of Learning Efficiency, and the differential significance of these distributions. The Tables indicate that the most efficient groups are the Over-Ideational Preschizophrenics in which only 9% of the cases have Efficiency Scores "less than −2", and the Patrol in which there are only 8%. On the other hand, all of the Depressive Psychotics and 43% of the Schizophrenics are in this impaired range. These then are the two most inefficient groups, followed by the Depressive Neurotics and the depressive-like Neurotic groups. The Table of differential significances shows that the Depressive Psychotics are more or less significantly worse than all other groups except the Schizophrenics, compared to whom the Depressives show only a trend to be more impaired. But the Schizophrenics are significantly worse than the combined Preschizophrenic groups, the better Neurotic groups, and the Patrol. The Patrol and the more efficient Neurotics are significantly better than all the other clinical groups except the Preschizophrenics.

TABLE 68-A.—*Percentage of Cases in Ranges of Learning Efficiency*

Babcock's Method

Group	No. of Cases	Percentage of Cases			
		< −4	< −2	< 0	≥ 0
(P + U) Sch	41	29	12	33	26
Pr C	12	8	17	25	50
Pr O-I	11	—	9	18	73
DP + DI	5	80	20	—	—
DSN + DN	12	50	8	—	42
O-C + Hy + MN	28	4	7	32	57
A & D + Neuras	12	33	8	33	25
Patrol	54	—	7	37	56

Revised Method

Group	No. of Cases	Percentage of Cases			
		< −4	< +2	< 0	≥ 0
(P + U) Sch	41	36	21	17	26
Pr C	12	—	25	25	50
Pr O-I	11	—	9	9	82
DP + DI	5	60	40	—	—
DSN + DN	12	42	8	8	42
O-C + Hy + MN	28	—	14	21	64
A & D + Neuras	12	25	8	42	25
Patrol	54	2	6	30	63

Although the breakdown of the Patrol into Schizoid and Anxious cases was made, no significant trends were revealed; we will thus forego any presentation of the statistical results. It should be noted, however, that within the normal range individual variation in the degree of anxiety or of schizoid trends present does not appear seriously to influence Learning Efficiency, and that Repetition Efficiency shows a vulnerability to anxiety which is *specific*.

We conclude that (1) Depressive Psychosis and Schizophrenia are the two most potent disorders making for impairment of Learning Efficiency. (2) Depression on a neurotic level makes for a milder impairment of Learning Efficiency. (3) Other types of Neuroses and Normal adjustments do not seriously impair the Learning Efficiency. (4) In contrast to their tendency on the Bellevue Scale, the Preschizophrenics do not thus far appear to follow the Schizophrenic pattern; that is, they show little impairment of Learning Efficiency and tend in many cases to excel in it. (5) Within the Normal range, anxiety or schizoid trends do not appear to significantly affect Learning Efficiency.

We shall see later in the analysis of the Motor subtests that the Depressive Psychotics are significantly worse than the Schizophrenics, and this will be one of the crucial differentiating measures between Schizophrenia and Depressive Psychosis. However, the impairment of concentration, implied by the poor Learning Efficiency, is present in both groups. In the Arithmetic and Picture Completion subtests of the Bellevue Scale, which we discussed also as tests of concentration, the Schizophrenics manifested impairment too. The parallelism of impairment in the Schizophrenics on the Babcock Test and Bellevue Scale thus offers some support for the contention that concentration is implied in both.

TABLE 68-B.—*Differential Significance of Distribution of Cases*

Groups Compared	Chi^2 (d.f. = 3)	Significance
(P + U) Sch : (Pr C + Pr O-I)	8.76*	<1%
(P + U) Sch : (DP + DI)	3.44**	30–50%
(P + U) Sch : (DP + DI)	1.90***	10–20%
(P + U) Sch : (DSN + DN)	2.09	50–70%
(P + U) Sch : (O-C + Hy + MN)	16.54	<<1%
(P + U) Sch : (A & D + Neuras)	3.68	30%
(P + U) Sch : Patrol	29.67	<<<1%
(DP + DI) : (DSN + DN)	4.70**	5–10%
(DP + DI) : (O-C + Hy + MN)	20.82**	<<<1%
(DP + DI) : (A & D + Neuras)	6.49**	2–5%
(DP + DI) : Patrol	59.48**	<<<<1%
(DSN + DN) : (O-C + Hy + MN)	13.48	<1%
(DSN + DN) : (A & D + Neuras)	3.66	30%
(DSN + DN) : Patrol	19.59	<<1%
(A & D + Neuras) : (O-C + Hy + MN)	10.97	1–2%
(A & D + Neuras) : Patrol	12.27	<1%

* 2 x 2 comparison: "<−4" or "not <−4"; d.f. = 1.

** Because there were no (DP + DI) cases in the 2 upper ranges, these were combined; d.f. = 2.

*** 2 x 2 comparison: "<−2" or "not <−2"; d.f. = 1.

(b) Analysis of the Relationship of Repetition Efficiency to Learning

Efficiency. Table 64, which presents the average LD and average RD for all our groups, shows that in general in the Unclassified and Paranoid Schizophrenics the impairment of Learning Efficiency is greater than that of Repetition Efficiency. The only other groups which show such a pattern are 3 of the Depressive groups and the Neurasthenics. We shall attempt to show in the following analysis that this pattern of a greater impairment of Learning Efficiency than of Repetition Efficiency is most

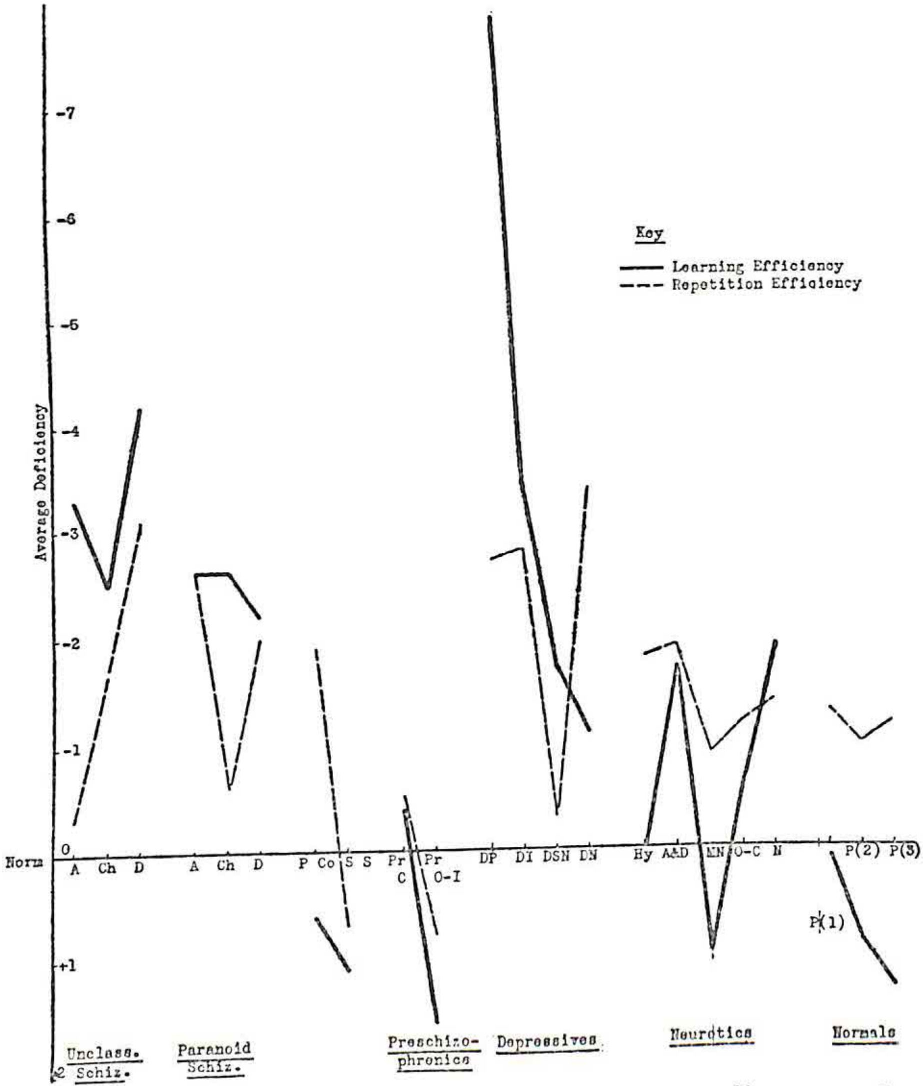


FIG. 25.—BABCOCK TEST: REVISED LEARNING AND REPETITION EFFICIENCY SCORES
Group Averages

diagnostic for Schizophrenia, even though according to the averages the Depressives also tend to show the pattern.

A clearer representation of this pattern is given in Figure 25 where the average modified Repetition Efficiency and average modified Learning Efficiency for all our groups are represented. The consistent tendency in the Schizophrenics to have Repetition Efficiency Scores superior to Learning Efficiency Scores is here apparent; the same tendency is seen in the Psychotic and Severe Neurotic Depressives. It is interesting to note that among the Neurotic groups, the Anxiety and Depression group approaches this pattern and the Neurasthenic group has it to a small degree, because of all the Neurotics these two groups most resemble the Depressives. In the three Patrol groups, however, the Learning Efficiency is consistently positive in average and the Repetition Efficiency is consistently negative. The closeness of these two averages in the Preschizophrenic groups is also striking, and indicates that they also tend to follow the Schizophrenics' pattern. We see thus far that both Schizophrenia and Depression may make for this pattern.

Before proceeding further with this analysis, let us turn to Figure 26, which presents the percentage distribution of cases in our Major clinical groups into *ranges of the difference* between the Learning and Repetition Efficiency Scores. In this graph the differences calculated both from the original Efficiency Scores, and from our modifications of them, are represented. Only in the Schizophrenics does the modified calculation result in a decrease in the percentage of cases with a Learning Efficiency in the same ranges as or superior to Repetition Efficiency; it remains the same in the Preschizophrenics, and gets much higher in the Depressives, the Neurotics, and the Patrol. In contrast, only in the Schizophrenics and Preschizophrenics does the modified calculation result in a significant increase of the percentage of cases with Learning Efficiency much inferior to Repetition Efficiency. Table 69 presents the actual percentages used to plot this graph.

We see then that our aim in modifying the Repetition and Learning Efficiency Scores to increase their diagnostic potency has been achieved. It was our hope in modifying the Repetition Efficiency Score that the great impairment in the Depressives, Neurotics, and Patrol, in contrast to the Schizophrenics, would be emphasized; it was our hope in modifying the Learning Efficiency Score that the greater impairment in the Schizophrenics would be emphasized. Figure 26 and Table 69 both indicate, on the basis of the difference between the Learning and Repetition Efficiency Scores, that these modifications have emphasized a specific trend in the Schizophrenics, in contrast to the other groups. This, then, is the final justification for the modifications we have introduced.

Let us return now to the discussion of the differential diagnostic use of the difference between Learning and Repetition Efficiency. If we consider in Figure 25 the graphlines which represent the difference between these modified Efficiency Scores, we see that the tendency to have Repetition Efficiency much better than Learning Efficiency is greatest in the Schizophrenics and Preschizophrenics; and conversely, he tendency to have Learning Efficiency about the same as or superior to Repetition

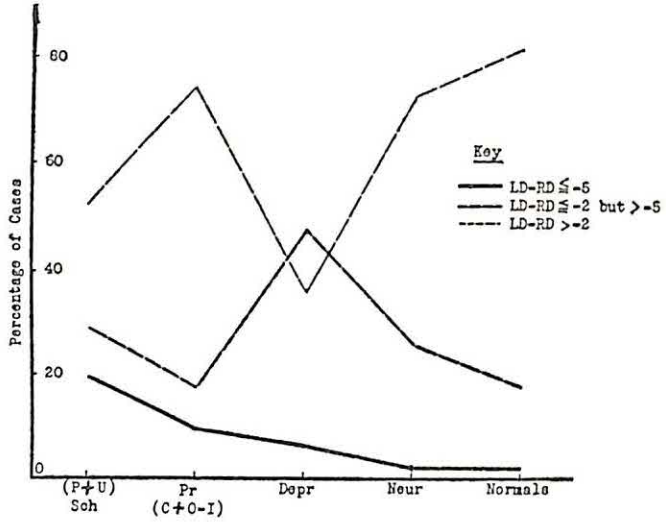


FIG. 26-A.—BABCOCK TEST: THE DIFFERENCE BETWEEN THE ORIGINAL LEARNING AND REPETITION EFFICIENCY SCORES
Percentage of Cases in Three Ranges of Difference

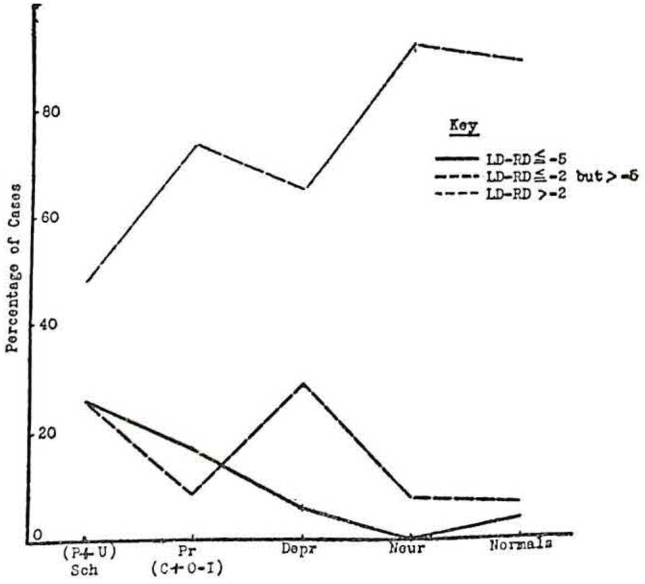


FIG. 26-B.—BABCOCK TEST: THE DIFFERENCE BETWEEN THE REVISED LEARNING AND REPETITION EFFICIENCY SCORES
Percentage of Cases in Three Ranges of Difference

Efficiency is least in the Schizophrenics. It is true that a considerable percentage of cases in all groups, including the Schizophrenics, do have a more impaired Repetition Efficiency; but the extreme reversal of this pattern, even though it occurs in a relatively small percentage of cases, is most prevalent in the Schizophrenic and Preschizophrenic groups.

Table 69-A presents the statistical analysis of the distribution of cases into three ranges of the LD–RD difference. If we consider the column headed "less than or equal to -5"—or, in other words, a Learning Efficiency which is much inferior to Repetition Efficiency—we see that the Schizophrenics stand out above all other groups by reason of their high representation in this range, and are approached only by the Preschizophrenics. The Depressives have only one case in this range, and this case clinically showed schizoid trends. The Neurotics have no cases in this range; the Patrol has two cases, one of which was a Schizoid Patrolman. Table 69-B presents the differential significance of these distributions; the Schizophrenics are seen to be significantly differentiated from the Neurotics and the Patrol, but show only a trend to be different from the Depressives.

TABLE 69-A.—*Percentage of Cases in Ranges of "DL–DR" Difference*

Babcock's Method					Revised Method				
Group	No. of Cases	Percentage of Cases			Group	No. of Cases	Percentage of Cases		
		>-2	≤ -2	≤ -5			>-2	≤ -2	≤ -5
(P + U) Sch........	42	52	29	19	(P + U) Sch........	42	48	26	26
Pr (C + O-I).......	23	74	17	9	Pr (C + O-I).......	23	74	9	17*
Depr................	17	35	47	6	Depr................	17	65	29	18
Neurotics...........	40	72	25	2	Neurotics...........	40	92	8	—
Patrol..............	54	81	17	2	Patrol..............	54	89	7	4**

* The reversal is frequently due not only to impaired Learning but to very superior Digit Span.

** One of these cases was a Schizoid Patrolman.

TABLE 69-B.—*Differential Significance of Distribution of Cases*

Revised Method

Groups Compared	Chi^2 (d.f. = 2)	Significance
(P + U) Sch : Depr..............................	3.28*	20%
(P + U) Sch : Neurotics..........................	20.68	$<<<1\%$
(P + U) Sch : Patrol.............................	19.75	$<<<1\%$

* Chi^2 is ineffective here since actually only 1 case of depression is <-5; furthermore, this case was schizoid.

In order to determine how to differentiate more sharply the Depressives from the Schizophrenics, we took into consideration the Motor Efficiency Scores. The Depressives—as will be seen in the following section—have a greater impairment of Motor Efficiency than the other groups. Using this characteristic of Depressives for differentiating them from the Schizophrenics, we put all cases having a Motor Efficiency Score of "-3 or less"—both in the Schizophrenic and Depressive groups—into the range of the lowest LD–RD difference. This eliminates the Depressive cases from the range of "great difference", while leaving 21% of the Schizophrenics still in it. The significance of this difference in distribution between the Schizophrenics and Depressives is on the 10% level (Table 69-C).

As we shall show, the Symbol Digit subtest is especially hard hit in the Depressives; accordingly, we took all the Schizophrenic and Depressive cases showing marked impairment on it, and included them in the range of the lowest LD–RD difference. As a result, only 6% of the Depressive group remains in the range of intermediate difference, and none is in the range of extreme difference; but the total for the Schizophrenics in these two ranges is 36%. The significance of this difference in distribution is on a 5–10% level, and by a special Chi^2 test can be brought to the 2–5% level (Table 69-D).

TABLE 69-C.—*Differential Significance of Distribution of Cases* (Motor Efficiency Score Taken into Consideration)

Group	Percentage of Cases		
	>-2	$\leqq-2$	$\leqq-5$
(P + U) Sch	60%	19%	21%
Depr	82%	18%	—

Groups Compared	Chi^2 (d.f. = 2)	Significance
(P + U) Sch : Depr	4.66	10%

TABLE 69-D.—*Differential Significance of the Distribution of Cases* (Symbol Digit Score Taken into Consideration)

Group	Percentage of Cases		
	>-2	$\leqq-2$	$\leqq-5$
Schizophrenics	64%	17%	19%
Depr	94%	6%	—

Groups Compared	Chi^2 (d.f. = 2)	Significance
Schizophrenics : Depr	5.73	5–10%
Schizophrenics : Depr	4.04*	2–5%

* Special Chi^2 for ">-2" or "not >-2"; d.f. = 1.

We have attempted to show by these special analyses that even though the Depressives have a large percentage of cases with Learning Efficiency much inferior to Repetition Efficiency, these cases may generally be distinguished from Schizophrenic cases by the fact that their Motor Efficiency, and specifically their efficiency on Symbol Digit, is strikingly impaired; this is much less frequently true in the Schizophrenics.

We conclude that (1) a Learning Efficiency Score much inferior to a Repetition Efficiency Score, but not accompanied by evidence of impaired Motor Efficiency, is diagnostic of Schizophrenia. (2) This impaired Motor Efficiency, characteristic of the Depressives, must be taken into account in evaluating the discrepancy between LD and RD.

We see here then a diagnostically significant difference between the RD and LD which is, in a sense, comparable to the "out-of-pattern" relationship of Digit Span and Arithmetic in the Bellevue Scale. Whether there is psychologically a common factor between Arithmetic and Story Recall, or whether the Schizophrenic process impairs each as a distinct and distinguished function, is difficult to decide. Later on, in the analysis of the error scores of Story Recall, we shall see that to a considerable degree it is "organization" which is impaired in the Schizophrenics' performance. It may be assumed, tentatively, that the function of organization is related to the function described as concentration. In our discussion of Picture Completion on the Bellevue Scale, we pointed out that attention and concentration both can act in receptive as well as in productive ways. We also pointed out that when the material dealt with becomes so difficult that attention does not suffice to give meaning to it, concentration is necessary. Such a process of "giving meaning" is one of organization. One could thus say that when the process of organization becomes very difficult, concentration begins to operate. Although memories are delivered by pure productive attention into consciousness, their consistency with the meaning of the total story, as well as its sequence may well be a function of the voluntary effort of concentration, testing parts against each other and against the total story.

It is noteworthy that, as already discussed, in the original calculation of averages this trend in the Schizophrenics is by no means as strong as in our modified calculation. Accordingly, we have excluded the meaningless Paired-Associates and the rote-automatic Symbol Digit, and restricted the measure of Learning Efficiency to the two tests of recall of a story, which implies reasoning about and memory for meaningful relationships; we compare this score with the scores obtained on only the meaningless Digit Span subtests—excluding from consideration the meaningful Sentence Repetition, thereby restricting this half of the comparison to tests of attention. Under these conditions, the difference between the Schizophrenics and the other groups comes more clearly to the fore.

The present authors believe that this "out-of-pattern" relationship in the Schizophrenics on both the Bellevue Scale and Babcock Test results from their inability to concentrate, to "turn back" voluntarily upon their own reasoning. The Neurotics and Normals are characterized by their inability for undisturbed effortless intake, while retaining the ability for the voluntary effort of concentration.

Future investigations will have to clarify the extent and kind of psychological activities which may be justifiably designated as dependent upon a fairly pure function of "attention"; these are the tasks on which Schizophrenics may be expected to perform fairly well, while Neurotics, especially anxiety cases, will do badly. Similarly, exploration is needed of those activities which can be justifiably considered as dependent upon a fairly pure function of "concentration"; these are the tasks on which the Schizophrenics may be expected to perform badly, while Neurotics, even anxiety-laden Neurotics, may be expected to do reasonably well.

(c) Analysis of the Quality of Recall. The Immediate and Delayed Story Recalls allow for a quantitative analysis of the qualitative features of the recall. This analysis can be done in terms of the amount and the kinds of errors in the recall of the story. Babcock herself realized this to the extent that she gave penalty scores for bizarre material introduced into the recall. But there are many significant features of recall which are not reached by Babcock's penalty scores, and which thus do not influence the score on these subtests.

We differentiated four degrees of increasing distortion, and numbered them 1, 2, 3 and 4, respectively.[11] It will be seen that within these four groups, we sub-differentiated two distinct types of errors—memories out-of-place (OP), and fragmentation of memories (Frag). The criteria for, and examples of, each of the four error scores are the following:[12]

Distortion Score 1. This score was given (a) for the substitution of words with allied but not synonymous meaning; (b) for the use of a vague term to represent a specific part of the story; (c) for the introduction of mild, "appropriate" material to accompany some of the nouns. Examples: (a) "injured" for *cut*, "arm" or "wrist" for *hand*, "village" for *town*, "a week ago" for *last week*; (b) "exposure" for *dampness and cold weather*, "flood" for *the river overflowed*, "lost lives" for *drowned*; (c) "small boy" for *boy*, "small river" for *river*.

Distortion Score 2. This score was given (a) for false memories; (b) for introduction of new elements. That is, this score was given for more serious distortions of the story than those in Score 1, provided they did not become bizarre. Examples: (a) the wrong number of people drowned or catching cold (providing the distortion is not unreasonable), "injured" for *caught cold*, "killed" for *drowned*, "in Albany", "Albany, N. Y.", giving the wrong date, "on" *Dec. 6;* (b) *the river overflowed* "its banks", *the river overflowed* "the town", *the man cut* "both" *hands*.

Distortion Score 3. This score was given (a) for serious distortions of content; (b) for recombination of parts of the story without resulting in queerness; (c) for the introduction of new material, usually of an emotional nature, with no specific source in the original story. Examples: (a) a grossly inaccurate recall of the number of persons drowned and/or catching cold, a reversal in the proportion of the number drowning and catching cold, "last year", "two weeks ago", "last winter", "south of Albany", "north of Albany", "the water entered shops" or "basements"; (b) "the boy cut his hand", "the man was caught under the bridge", the boy was caught "on" the bridge; (c) "the boy drowned", "the man drowned", "killed and wounded (or injured)" for *drowned and caught cold*, "the bridge was overflowed", "people were left out in the cold", "the water was so high it flooded the streets", "the town the water damaged", "the man seriously (or severely) cut his hands" or "smashed his hands".

---

[11] In general, only those distortions worthy of a score of *4* were penalized in the actual scoring of the subtest by the subtraction of one unit, as specified by Babcock.

[12] The decision as to what error score should be assigned to different types of distortions was arbitrary. Our scoring criteria are neither completely correct nor final. The weighting Scale we devised did, however, justify itself by helping to clarify the differences in Learning Efficiency between different clinical and normal groups.

Distortion Score 4. This score was given (a) for introduction of *new* material of a strong emotional tone; (b) for introduction of material which was bizarre and unrelated to the original story; (c) for a re-combination of the elements of the original story making the story altogether different, though perhaps involving the same events. Examples: (a) *the people were* "homeless", *the bridge was* "washed away" or "fell", *the boy was* "washed downstream", *the people got* "pneumonia"; (b) giving the boy a specific age, "there was a storm", "it rained", "December 6, 1942"; (c) "a man saved 14 people from drowning under a bridge."

Out-of-place memories. It frequently occurs in all groups that some segment of the story is recalled out of its correct sequence in the story. Where this segment was separated from its original place by a complete thought, a distortion score of 2 was given.

Fragmentary Memories. It occurs, especially in Schizophrenics, that a phrase or even part of a phrase is remembered but its relation to the story is lost. The subject might recall, "A boy . . . something about boy". Such fragmentation was scored 4 in each instance.

To elucidate further the meaning of errors, it was deemed advisable to give full story samples here in addition to the isolated examples given for the different error scores. On these examples it can be demonstrated how the—for statistical purposes—mechanically-classified errors can be evaluated qualitatively also.

A clear example of affect and attitude shaping the memory distortion is given in the Immediate Recall of Mixed Neurotic No. 1. This patient ended an otherwise fairly good recall as follows: "In rescuing a boy from a bridge . . . somebody must have been drowned". It is obvious that she had forgotten exactly what happened to the person who rescued the boy, although she remembered that something did happen to the rescuer; and what she finally offers can be assumed to be a direct consequence of the whole feeling-tone elicited in her by the story—namely, that related to the ideas of death and misfortune.

Perhaps an even clearer example of affective reorganization of the story is seen in a case (No. 9 in Hysterics) in which a Paranoid Condition and Hysterical symptoms both were present, and whose violent aggressions against males in general, and her husband in particular, were outstanding. Her recall reads: "December 6, a river overflowed in the town of Albany.

1400 men were drowned and 600. . . . In saving a boy who was drowning a man was injured. I think he *had his hand smashed*." The first major distortion is "1400" instead of "14". This seems related to her changing "persons" to "men", and achieving a great destruction of men. The second major distortion is "he had his hand smashed". At first she said merely "injured", but apparently the influence of her intense hostility upon the vague memory that the injury was more specific elaborated it in tune with her prevalent affective attitude, and as a result she had the man's hand "smashed."

In general, these errors may all be characterized as emotional elaborations of implicit or direct statements of the original story. Emotional elaboration is obvious in such expressions as "many people were left homeless", "great damage was done", "the man cut his hand severely", "a terrible flood", and so on—where it is apparent that the elaborations are based on the feeling-tone usually accompanying ideas of great destruction and catastrophe, and elicited in the subject by the story.

Where affects corresponding to intense aggressions or to destruction phantasies are well controlled—as in many normals—the mere reading of a story will not elicit these affects in such force that they may distort the recall. It is for this reason that these distortions become diagnostically significant. It is interesting to note here that the Hysterics, characterized clinically by their affective lability and impulsiveness, are very prone to produce such distortions, especially in their Immediate Recall. The extreme of this type of emotional distortion in recall are such expressions as "washing trees and roads away", "washing the bridge down", and so on. The weakening control of affects can progress so far that not only affective elaborations and distortions occur in the recall, but the affects elicited push their ideational representations, foreign to the logical meaning and structure of the story, into consciousness; thus new material is introduced which is not at all justified by anything in the story. This is no longer modification of memories by emotions, but an expression of a complete and far-reaching breakdown of the subjective distinction between memories of reality and memories of phantasy.

There occur also mild forms of these distortions to which proportionately less significance is to be attached. For instance, *boy* will become "a small boy"; the river may be called "a small river". The fact that it was a child to whom this happened, or that it happened in the vicinity of a small town, has in these cases introduced a modification which appears as a displacement of an adjective; this modification may be understood to be the effect of an attitude elicited in the subject by one part of the story, upon other parts of it in recall.

A few examples will be given here to illustrate, first, that not *only* in schizophrenics or in psychotics do great distortions occur; and secondly, that the quality and manner of occurrence of distortions nevertheless allow for some differentiation between psychotics and non-psychotics.

The following is the Immediate Recall given by one of the ablest Patrolmen of our control group (No. 12 in the Well-Adjusted Patrol). "December 6, last week, a *terrible* flood 14 miles from Albany. Water covered the streets and *lawns* and 14 people were drowned and 600 *injured*. A man cut his hand rescuing a boy who was caught *on a fence*." *Lawns* and *fence* are complete departures from the story, while *terrible* and *injured* are both distortions referrable to his affect-dominated recall. Nevertheless, in the evaluation of the memory efficiency of this case, it must be noted that he had an almost flawless Delayed Recall, a feature militating against the pathological implications of the previous distortions.

For the sake of contrast, the recall of a Schizophrenic follows here (Chronic Unclassified Schizophrenic No. 2). Immediate Recall: "December 6, a small boy was saved when the weather was damp from drowning." Delayed Recall: "December 6 a small boy saved 600 people from drowning. The weather was damp." The first example illustrates a feature common to many Schizophrenics' records—a recombination of isolated fragments into a superficially meaningful-looking recall. This becomes even more striking in the Delayed Recall, where four isolated parts of the story are remembered as fragments and re-integrated into a new story, and a fifth fragment is left hanging: "the weather was damp". The recombination involved a boy, saving, 600 people, and drowning; these elements were not immediately related to each other in the actual story. The second recall is even more arbitrary than the first: the sentence structure itself is here a clue to the Schizophrenic character of these recalls, which are given quite glibly without pause and without much searching for other memories.

Another kind of Schizophrenic recall pattern is seen in the following (Deteriorated Unclassified Schizophrenic No. 3). Immediate Recall: "December 6, last week, 14 people were drowned when the river overflowed in a small town . . . a 100 . . . or 400 . . . most of them were saved . . . some 400 people because one man rescued a 14-year old boy was saved". Of striking interest here are the recombination of elements into the idea that most of the people were saved; the contamination and/or perseveration, as in the use of the number 4, in 14 as the age of the boy and in 400 as the number of people; and, worst of all, the incoherence resulting from the causal connection implied in "*because* a man rescued a boy". The Delayed Recall, as in most far-gone Schizophrenics, is much worse: "Last week there were in a town about 40 miles from Albany, or was it 1400 miles, when the river overflowed. . . . There was much confusion. . . . For when 14 people were drowned and 600 were ill. . . . The town was overflowed with water.

. . . The water was very deep, wasn't it? Much concern was caused when one boy risked his . . . no, yes, 14 years old risked his life saving people under a bridge. . . . Cut his hand. . . . Must have lost his life." Incoherence, recombination of elements of the story, the distortions resulting from affective attitudinal reactions to the original material, mixing up of and perseverative use of the numbers involved in the story, are the salient characteristics of this recall.

Such bizarre distortions of the story are not limited to far-gone Schizophrenics, however. Cases from other nosological categories may have distortions which are sometimes hard to differentiate from those of Schizophrenics. For instance, we may quote the recall of an Over-Ideational Preschizophrenic (No. 9). Immediate Recall: "December 6. A river overflowed its banks in Albany and entered the streets and houses. 14 persons drowned and 600 were sick, no. . . . The boy . . . I have forgotten it . . . *hanging on with his hand on the bridge, trying to save the bridge, caught cold.*" The absurdity of this recombination at the end of the story needs little discussion. The structure and sequence, however, have been otherwise relatively well-preserved. Another instance is that of a case which was classified in the Obsessive-Compulsive group (No. 11), but for whom a diagnosis of Preschizophrenia was seriously considered. Delayed Recall: "December 6. In a small town the river flooded over, I think it was washing trees and roads. . . . 14 people were drowned. . . . Something in between there but I can't figure it. . . . 600 people caught cold. A man while trying to save the life of a small boy. . . . Oh, there is a. . . . Wait a minute. . . . Who was caught under a bridge. . . . Or bridge falling in . . . bridge collapsed . . . cut his hand." The conscious effort to reconstruct the story accurately and the feeling for gaps in it are of course not characteristically psychotic; but the extent of distortion is suggestive. Diagnostically, the experienced examiner will sense that such a recall might indicate a near-psychotic condition retaining enough integration to sense the gaps and distortion; this was actually the case here.

The next example is that of a Severe Neurotic Depressive (No. 7), a clinical category which as a rule stumbles on Story Recalls. Delayed Recall: "December 6. A big rain came and flooded the streets. 600 houses and 1400 people. . . . One boy nine years old was taken down the stream, caught by the bridge, cut both hands." Obviously distortions are present, similar to those seen in Schizophrenics.

The next case is that of a Neurasthenic, (No. 5).[13] Immediate Recall: "Last Wednesday on December 6 there was a heavy rain. . . . Overflowed a bridge 6 miles from Albany. . . . A boat overturned in which there were

---

[13] Clinically this man's neurasthenia was described as his last defense against a depressive psychotic break.

14 people and in trying to rescue them a man cut his hands." Here again emotional elaboration, introduction of strange new material, and a general disorganization of the structure of the story are present. There were no signs in the recall that he was conscious of gaps and distortions. His Delayed Recall was nearly perfect, which distinguished his performance from the usual Schizophrenic and Depressive type: he gave 17 correct memories, with no distortions.

In spite of this overlapping presence of very disorganized recalls in the different clinical groups, we shall attempt to show in the following statistical analysis that bizarre distortions and the greatest disorganization are generally associated with psychosis, and especially with Schizophrenia.

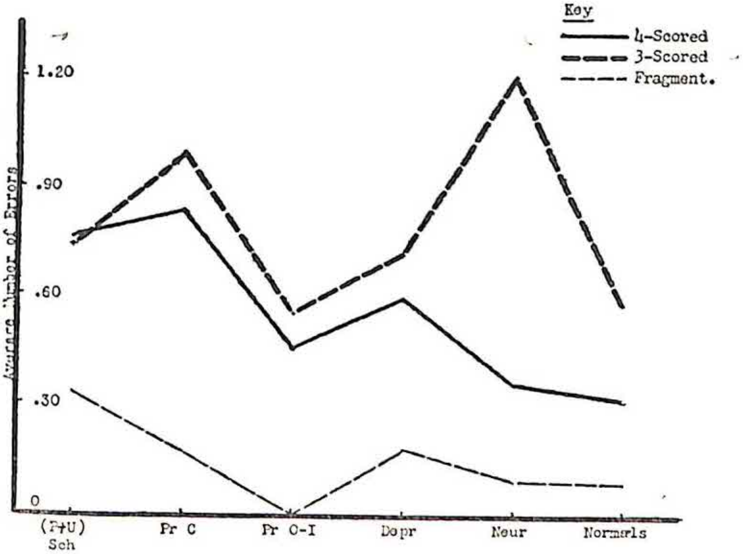


FIG. 27.—BABCOCK TEST: IMMEDIATE RECALL
Group Averages of 3-Scored, 4-Scored, and Fragmentation Errors

Figure 27 presents for the major clinical groups the average number of errors scored "3", "4", and "fragmentation" on Immediate Recall, while Figure 28 presents the same averages on Delayed Recall. It is apparent that the Schizophrenics and the Coarctated Preschizophrenics have a much greater incidence of bizarre distortions (scored 4) than any of the other groups. The Over-Ideational Preschizophrenics and the Depressives are the next worst groups, and best of all are the Neurotics and the Patrol. The averages for great but not bizarre distortions—scored 3—follow a quite different pattern. First, in all the groups except the Schizophrenics the average for this type of error is higher than the average for the bizarre distortions. In other words, only in the Schizophrenics will one most frequently find as great an incidence of bizarre distortions (4) as of severe but not bizarre distortions (3). It is striking that of all the groups the Neurotics have the highest average of the distortions scored 3. This is in marked contrast to their very low average of distortions scored 4.

For a better understanding of this trend in the Neurotics, let us turn to the footnote in Table 70. This footnote indicates that the high Neurotic average is essentially due to the Hysterics, who have an incidence of 3-scored distortions more than twice as great as that of all the other Neurotic groups. In other words, in Neurotics, and especially in Hysterical Neurotics, affective encroachment upon memory efficiency as represented by the incidence of 3-scored errors is significantly frequent. The Neurotics, and the Hysterics, however, have hardly any 4-scored errors—those which represent a disregard of the structure and meaning of the story, and are the representation of personal affects and ideas.

To return to Figure 27, we see that the Schizophrenics are outstanding also in the relatively great incidence of fragmentary memories. The Patrol is consistently among the lowest, if not the lowest, in the incidence of these three most serious types of disturbance of recall.

TABLE 70.—*Averages of Each Kind of Error*

Group	No. of Cases	Immediate Recall						Delayed Recall					
		Errors				O-P	Frag.	Errors				O-P	Frag.
		1	2	3	4			1	2	3	4		
(P + U) Sch........	41	.67	.90	.74	.76	.36	.33	1.09	.88	1.17	.93	.43	.17
Depr................	17	.59	1.12	.71	.59	.12	.18	.76	1.35	.82	.94	.24	.12
Neurotics...........	40	.80	1.15	1.20*	.35	.28	.10	1.48	.85	.48	.25	.28	.08
Patrol...............	54	.87	1.30	.56	.31	.24	.09	1.46	.65	.52	.06	.22	.04
Pr C.................	12	.67	1.33	1.00	.83	.08	.17	1.33	.75	.58	.42	.17	—
Pr O-I..............	11	1.18	.73	.55	.45	.36	—	1.45	.55	.27	.09	.18	.09

* The breakdown of this average: Hysterics (N = 12) average 1.92; other Neurotic (N = 28) average .89.

Table 70 presents the averages for the major clinical groups on the 6 types of errors we have distinguished. 1-scored errors—mild appropriate distortions—are least frequent in the Schizophrenics, the Coarctated Schizophrenics, and the Depressives—the three groups showing the greatest incidence of 4-scored errors; the average of the 4-scored errors in these three groups equals or exceeds the average of the 1-scored errors. That is, in those groups characterized by especially severe impairment of efficiency of Immediate Recall, the incidence of bizarre distortions is even more prominent than the very mild distortions.

The incidence of 2-scored errors shows little differentiation among the groups, except for the outstandingly high representation of the Patrol group in this respect. The Patrol was also outstandingly high in the incidence of 1-scored errors; but on none of the other errors do they follow this trend. In other words, it is rather typical of Normals to have distortions in their recall, but these distortions do not go beyond a mild or intermediate degree. We have already discussed the relative incidence of 3-scored errors, and stressed that their greatest incidence by far occurs in the Hysterics. These distortions, as already described, are severe distortions made more or less obviously under the impact of emotional and attitudinal responses to the story, but without the introduction of bizarre features. It is noteworthy that the poor control of affects manifested clinically by the Hysterics is also manifested in memory functioning by the emergence of affectively-toned distortions.

We have already discussed the incidence of 4-scored errors and fragmentation. In the relative incidence of out-of-place memories too, the Schizophrenics are outstandingly high, and are equalled only by the Over-Ideational Preschizophrenics. This finding concerning the Over-Ideational Preschizophrenics is of significance, as out-of-place memories indicate a weakening of the "feel" for the structure and sequence of the story. These Preschizophrenics show, both on Figure 27 and Table 70, a relatively low incidence of severe distortions. One might speculate then that in such cases, thought processes and memory are still sufficiently under control to allow for a relatively correct recall of the story; but that the pre-psychotic condition of these cases first manifests itself in a loss of the subject's "feel" for structure and sequence. Such out-of-place memories, if occurring with relatively great frequency, should be regarded as possibly indicative of the beginning of a psychotic process. The number of cases in the group is however small, and these conclusions require further confirmation.

TABLE 71-A.—*Percentage of Cases with 4-Scored Errors*

Immediate Recall

Group	No. of Cases	Percentage with:		
		0	1	2 or more
(P + U) Sch.......	41	50	33	17
Depr..............	17	53	41	6
Neurotics..........	40	78	18	5
Patrol.............	54	72	24	4
Pr C...............	12	50	33	17
Pr O-I.............	11	73	18	9

TABLE 72-A.—*Percentage of Cases with 4-Scored Errors*

Delayed Recall

Group	No. of Cases	Percentage with:		
		0	1	2 or more
(P + U) Sch........	41	50	31	19
Depr................	17	65	6	29
Neurotics...........	40	80	15	5
Patrol..............	54	94	6	—
Pr C................	12	75	8	17
Pr O-I.............	11	91	9	—

TABLE 71-B.—*Differential Significance of Distribution of Cases*

Groups Compared	Chi^2 (d.f. = 2)	Significance
(P + U) Sch : Neurotics...............	6.92	2–5%
(P + U) Sch : Patrol.	6.90	2–5%
Depr : Neurotics.....	2.36*	10–20%
Depr : Patrol.........	1.40*	20–30%

* 2 x 2 comparison: "0" or "not 0"; d.f. = 1.

TABLE 72-B.—*Differential Significance of Distribution of Cases*

Groups Compared	Chi^2 (d.f. = 2)	Significance
(P + U) Sch : Neurotics................	8.44	1–2%
(P + U) Sch : Patrol..	25.63	<<<1%
Depr : Neurotics......	4.53*	2–5%
Depr : Patrol..........	7.82*	<1%

* 2 x 2 was done here for "2 or more" or "less than 2"; d.f. = 1.

Table 71 presents the percentage distribution of cases in the major clinical groups having in the Immediate Recall no 4-scored errors, having one 4-scored error, and having two or more 4-scored errors. Again the Schizophrenics and Coarctated

Preschizophrenics exceed all the other groups with a great incidence of such Error Scores. However, the Depressives are not statistically differentiable, to any significant extent, from the Schizophrenics. The differential significance of the distributions presented in Table 71 shows that the Schizophrenics are significantly worse than the Neurotics or Patrol, while the Depressives show only a greater or lesser trend to be differentiated from them.

We conclude that (1) Schizophrenics and Coarctated Preschizophrenics exceed all other groups in incidence of extreme and bizarre distortions, and are approached only by the Depressives. (2) A great incidence of severe distortions may be therefore most reliably taken as an indication of a Schizophrenic disorder. (3) A high incidence of affectively-toned great but not bizarre distortions appears to be associated with great affective lability and impulsivity, such as is found in Hysterics. (4) The occurrence of memories out of their correct sequence, if occurring sufficiently often, may be the first sign of a Schizophrenic disintegration of memory organization. (5) In Neurotics and especially Normals, the incidence of bizarre distortions or fragmentary memories is very low.

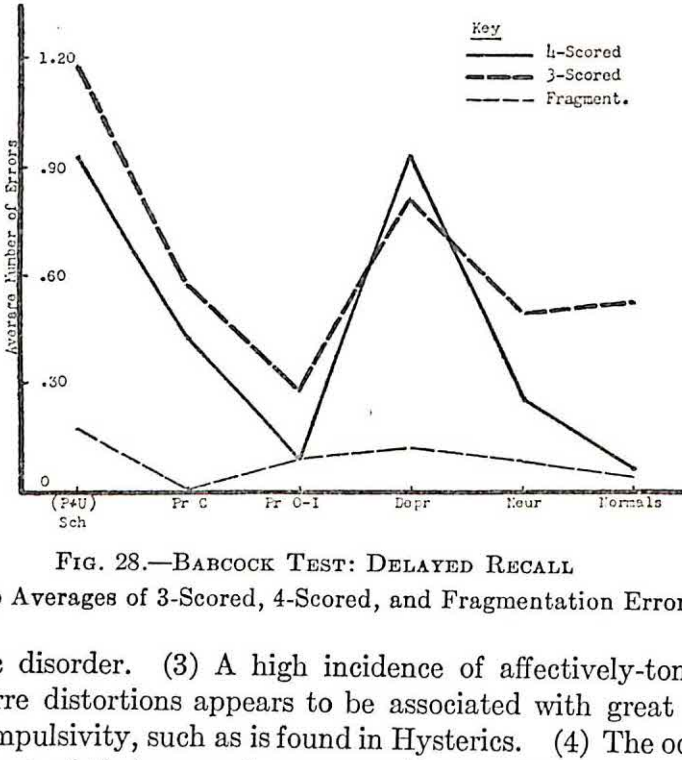


FIG. 28.—BABCOCK TEST: DELAYED RECALL
Group Averages of 3-Scored, 4-Scored, and Fragmentation Errors

Let us turn now to the average frequency of 3-scored and 4-scored errors and "fragmentation" on the Delayed Recall, represented in Figure 28.

Here we note several changes of the pattern of the graphline from that for the Immediate Recall. First of all, the Coarctated Preschizophrenics, which were on an equal level with the Schizophrenics in the Immediate Recall, show considerable improvement on Delayed Recall, while the Schizophrenics become somewhat worse.

In other words, when the Delayed Recall of the story begins to lose some of the serious distortions present in the Immediate Recall, a preschizophrenia rather than a frank full-blown schizophrenic psychosis is indicated. Another change is that the Depressives now have an equally great number of bizarre distortions as the Schizophrenics, which was not the case in the Immediate Recall. This is a slight indication of a differentiation between the Schizophrenics and the Depressives, inasmuch as the Schizophrenics are very poor on both recalls. The Patrol has almost no 4-scored errors, showing a marked reduction of them from the Immediate Recall, and indicating the great benefit derived by Normals—at least, in incidence of serious distortions —from the re-reading of the story. The Neurotics also show some improvement.

In 3-scored errors, there is a reduction of incidence in the Neurotics and Preschizophrenics indicating the benefit they derive from the re-reading. Normals remain on about the same level of 3-scored errors as in the Immediate Recall; Depressives become somewhat, and Schizophrenics considerably, worse.

The meaning of the incidence of fragmentary memories for group differentiations is less clear on the Delayed Recall than on the Immediate Recall, because the incidence is decreased. Nevertheless, the Schizophrenics still have the highest such incidence.

Table 70 presents the averages on all six kinds of errors for the Delayed Recall. All the groups show a much higher incidence of 1-scored errors—very mild distortion —than they did on the Immediate Recall; and similarly, all the groups, except the Schizophrenics and the Depressives, show a reduction in the frequency of 2-scored errors. This trend for reduction of errors in Delayed Recall is present also for 3-scored and 4-scored errors and "out-of-place" memories in all the groups excepting the Schizophrenics and the Depressives. This demonstrates that all groups except these two derive benefit from the re-reading of the story; the Schizophrenics and the Depressives, presumably because of their impaired concentration, and frame of reference not only derive no benefit from the re-reading, but actually are more disorganized on the Delayed Recall.

The differential significance of the frequency of the 4-scored errors in Table 72 shows that the Schizophrenics and the Depressives are significantly worse on the Delayed Recall than the Neurotics and the Patrol.

We conclude that (1) Schizophrenics and Depressives tend to derive little benefit from the re-reading of the story by the examiner; consequently, the incidence of serious distortions, and the loss of feel for the structure and sequence of the story, increase in the Delayed Recall of these groups. (2) All other groups do derive benefit from the re-reading; consequently, the incidence of serious distortions decreases in their Delayed Recall, and the feel for structure and sequence is well-retained.

These error scores are then essential data to be considered together with the actual Learning Efficiency Score when evaluating the memory efficiency of the subject. To make the use of these Error Scores more systematic, and to make the Error Scores of one individual comparable to those of another, we devised the following procedure. We obtained the sum of the Error Scores on each recall of each individual. However, subjects who recall more material have an opportunity to make more errors; individuals who recall very little material often have only one or two errors, which in themselves may indicate considerable disorganization. We felt that to evaluate properly the sum of the Error Scores[14] it should be converted into a percentage which would take the amount of recall into account. For instance, if the sum of the errors in a recall added up to 6 and the number of correct memories was 12, the error percentage was 50. If the number of correct memories increased to 20, and at the same time the sum of the Error Scores increased to 10, the error percentage would still be 50; this case would be showing no greater amount of distortion than was to be expected in a long recall. But if only 6 correct memories were given and the error sum were 10, the resulting error percentage would be 167; this would indicate that the amount of distortion was far out of proportion to the amount of retained material, and would indicate considerable disorganization of memory efficiency. We thus calculated the error percentage of the Immediate and Delayed Recall of all of our subjects.

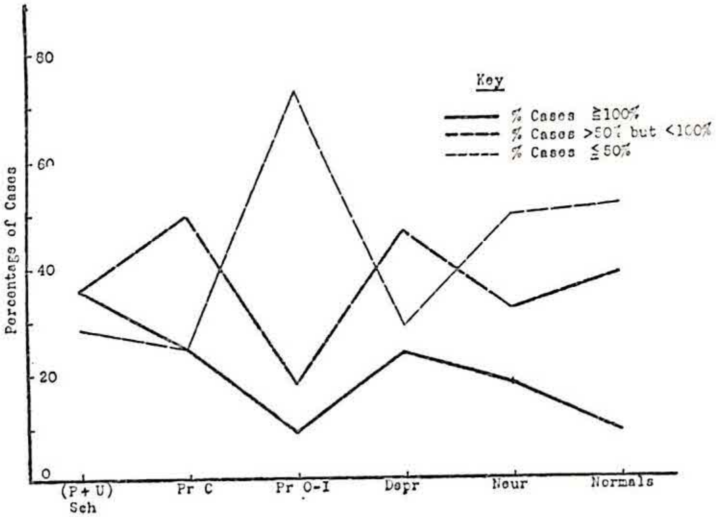


FIG. 29.—BABCOCK TEST: ERROR PER CENT ON IMMEDIATE RECALL
Percentage of Cases in Three Ranges of Error Per Cent

Figure 29 represents for the Immediate Recall the percentage of cases in each clinical group falling into three ranges of the "error percentage" distribution: zero to 50%, 51% to 100%, and more than 100%. The Schizophrenics show the greatest percentage of cases above 100%, and are approached only by the Coarctated Preschizophrenics and the Depressives. Conversely, the lowest percentage of cases from zero to 50% is found in these groups. The Over-Ideational Preschizophrenics, in contrast to the

---

[14] To this sum, one 3-scored error contributed 3 units; a 4-scored error contributed 4 units, etc.

Coarctated Preschizophrenics, show an incidence of cases in the low range even greater than the Neurotics and Normals. The Normals have a percentage of cases in the highest range as small as the Over-Ideational Preschizophrenics.

Table 73 presents these percentages in numerical form, showing that more than one-third of the Schizophrenics have error percentages greater than 100, while less than one-tenth of the Patrol and Over-Ideational Preschizophrenics do. The other groups assume a more or less intermediate position. The differential significance of these distributions shows the Schizophrenics to be significantly worse than the Patrol, and to tend to be worse than the Neurotics. The Depressives show only a tendency to be worse than the Patrol, but this minimal result is referable to the low number of cases in the Depressive group. The *distribution* of the Depressives, however, is strikingly different from that of the Patrol.

TABLE 73-A.—*Error Percent on Immediate Recall*

Group	No. of Cases	Percentage of Cases with:		
		0–50%	51–100%	>100%
(P + U) Sch	42	29	36	36
Depr.	17	29	47	24
Neurotics	40	50	32	18
Patrol	54	52	39	9
Pr C.	12	25	50	25
Pr OI	11	73	18	9

TABLE 73-B.—*Differential Significance of Distributions of Cases*

Groups Compared	Chi^2 (d.f. = 2)	Significance
(P + U) Sch : Neurotics	4.98	5–10%
(P + U) Sch : Patrol	10.94	<1%
Depr : Neurotics	2.08	30–50%
Depr : Patrol	3.58	10–20%
Neur : Patrol	1.53	30–50%

Let us turn now to the percentage distribution of cases into three ranges of error percentage on the Delayed Recall, represented in Figure 30. Here the percentage of cases of the Schizophrenics having an error percentage above 100 is increased, while their percentage of cases with an error percentage from zero to 50 is slightly decreased. The only other group showing this pattern is the Depressive group which, as we have seen, tends to get much more disorganized on the Delayed Recall. All the other groups show a decrease of cases with an error percentage above 100; and

Table 75-A presents these percentages in numerical form; we see that although the Depressives and the Schizophrenics have an equal percentage of cases with a more impaired efficiency on the Delayed Recall, the Depressives have 30% more cases than the Schizophrenics with an improvement on Delayed Recall. The Schizophrenics have 71% cases showing increase of the error percentage on the Delayed Recall; no other group, not even the Depressives, comes close to this. In other words, in about 7 out of 10 Schizophrenics the ratio of the amount of errors to the amount of correct memories is likely to increase in the Delayed Recall; and in 4 out of 10 Schizophrenics, this increase will be of an extreme degree. Table 75-B presents the differential significance of these distributions. The Schizophrenics are significantly worse than the Neurotics and the Patrol; the Depressives are significantly worse than the Patrol and show a tendency to be worse than the Neurotics; and even between the Neurotics and the Patrol there is a mild differentiation, largely as a consequence of the greater representation of the Neurotics in the "much poorer" range.

TABLE 75-A.—*Percentage of Cases in Ranges of the Difference: Error %$_{oI}$–Error %$_{oII}$*

Group	No. of Cases	Percentage of Cases		
		≧0	−1 to −30	<−30
(P + U) Sch	42	29	31	40
Depr	17	59	—	41
Neurotics	40	72	12	15
Patrol	54	77	17	6
Pr C	12	67	25	8
Pr O-I	11	73	27	—

TABLE 75-B.—*Differential Significance of Distributions*

Groups Compared	Chi² (d.f. = 2)	Significance
(P + U) Sch : Neurotics	15.82	<<1%
(P + U) Sch : Patrol	25.90	<<<1%
Depr : Neurotics	3.28*	5–10%
Depr : Patrol	10.77*	<<1%
Neurotics : Patrol	2.58	20–30%

* 2 x 2 Comparison: "<−30" or "not <−30".

In order to check whether the Schizophrenics and Depressives show merely an increase in the number of distortions in the Delayed Recall, with the number of correct memories remaining the same, or whether the number of correct memories decreases with the increase in the number of distortions, we carried through a further statistical analysis.

We obtained the difference between the actual number of correct memories on the Immediate and Delayed Recalls for all our cases. We have mentioned previously that, according to Babcock's instructions, four extra credits are given on the Immediate Recall to render it comparable to the Delayed Recall by eliminating the advantage for the latter of the re-reading. The scores on these two subtests are therefore roughly comparable, and a decrease of score in the Delayed Recall as compared to the Immediate Recall indicates actual impairment. Table 76 presents the percentage distribution of cases for the major clinical groups into three ranges of this difference: (1) a score on the Delayed Recall more than 2 units higher than that on the Immediate Recall, (2) a score on the Delayed Recall from no units to two units higher than that on the Immediate Recall, and (3) a score on Delayed Recall less than that on the Immediate Recall. The highest percentage of cases in this third range occurs in the Depressives and Schizophrenics; the lowest percentage occurs in the Neurotics and in the Patrol. The differential significances of these distributions are that the Depressives are worse than the Neurotics and the Patrol; the Schizophrenics are worse than the Patrol, and show a strong tendency to be worse than the Neurotics. In other words, in the Schizophrenics and in the Depressives, not only does the amount of errors increase in the Delayed Recall, but simultaneously the actual number of correct memories decreases. The simultaneous presence of these two trends is therefore a sign of considerable disorganization of memory efficiency, being most likely to occur in Schizophrenics and Depressives.

TABLE 76-A.—*Percentage of Cases in Ranges of the Difference: Score on No. 4 Minus Score on No. 11*

Group	No. of Cases	Percentage of Cases		
		>2	0–2	<0
(P + U) Sch	42	21	33	45
Depr	17	12	29	59
Neurotics	40	32	45	22
Patrol	54	41	41	18
Pr C	12	33	42	25
Pr O-I	11	45	18	36

TABLE 76-B.—*Differential Significance of Distributions*

Groups Compared	Chi² (d.f. = 2)	Significance
(P + U) Sch : Depr	1.12	50–70%
(P + U) Sch : Neurotics	4.83	5–10%
(P + U) Sch : Patrol	8.71	1–2%
Depr : Neurotics	7.36	2–5%
Depr : Patrol	11.02	<1%

We conclude that (1) the error percentage, or the ratio of the sum of the Error Scores to the sum of the correct memories, is most characteristically high in the Schizophrenics and Depressives. (2) The Schizophrenics and Depressives, in contrast to all other groups, show the error percentage significantly increasing in the Delayed Recall. (3) This increase is more striking in the Schizophrenics than in the Depressives, and appears therefore to be most characteristically a feature of Schizophrenic memory disorganization. (4) The Neurotics and especially the Normals show a significant decrease in their error percentage in the Delayed Recall, even though in their Immediate Recall the error percentage was low to begin with.

5. The Statistical Evaluation of the Motor Subtests.[15] The reader will remember that we retained the three subtests Babcock put into this group, although we found that they were not consistent with each other. The choice was either to throw them all out and substitute new ones—which we were not prepared to do—or to retain all three because, as we have shown in the discussion of Learning and Efficiency, the Motor Efficiency Score proved especially useful in differentiating between Depressives and Schizophrenics. We have chosen the latter procedure, in the absence of a new variety of motor tests—such as simple tapping, peg-boards, and so on—standardized for use in the same manner as the other Babcock subtests. A few qualitative and quantitative characteristics of these subtests appear to be diagnostically useful.

The average Motor Efficiency Scores (MD) for our 22 groups are represented graphically in Figure 21. The summary of this graph for the major clinical groups, Figure 22, indicates the major trends: the Depressive Psychotics far exceed all other major clinical groups in the extent of impairment of Motor Efficiency; these are followed by the Depressive Neurotics, though the impairment of the latter is only half as great as that of the former; the Schizophrenics have even less impairment, the Neurotics still less, and the Patrol a negligible impairment. We see then that impairment of Motor Efficiency appears to be most directly related to the presence of Depressive trends, and the severity of these depressive trends may be estimated by the extent of impairment of Motor Efficiency.

The detailed group breakdown in Figure 21 indicates several additional trends. First of all, within the Neurotic groups, the group most closely related to the Depressives—the Anxiety and Depression group—has the greatest impairment of Motor Efficiency. This further attests to the relationship between impaired Motor Efficiency and the presence of depressive trends. Furthermore, the Obsessive-Compulsives also have a somewhat impaired Motor Efficiency, although this impairment is much less than that found even in the Neurotic Depressives. On the Bellevue Scale also, the Anxiety and Depression group, and to a lesser extent the Obsessive-Compulsives, follow the Depressive pattern on the 3 subtests of visual-motor coordination and psychomotor speed. The Babcock Test then offers confirmation of the relevant results on the Bellevue Scale.

Table 65 presents the average Motor Efficiency Score for those of our groups with evidence of impairment of Efficiency. This impairment appears significant not only in the Depressive Psychotics and Depressive Neurotics, but also in the Schizophrenics. However, the extent of the impairment is so much greater in the Depressive groups that they are easily differentiated from the Schizophrenics. The two Neurotic groups which follow the Depressive pattern—the Anxiety and Depression group, and the Neurasthenics—show mild trends toward significant impairment of Motor Efficiency.

---

[15] The Motor Efficiency Score (MD) is obtained by averaging the scores of subtests 5, 9, and 10, and subtracting from the average the Motor Norm corresponding to the Vocabulary Age of the subject.

The significant, though small, impairment of the Schizophrenics deserves some comment. It is true that there are some Schizophrenics who, besides their major Schizophrenic pathology, have also a significant depressive trend. Such cases may account at least in part for this significant average. However, other factors, such as distractability interfering with efficiency on Symbol Digit, pre-occupation with the content of the sentence in Sentence Writing, and recklessness or carelessness in Maze-Tracing resulting in penalization for crossing the maze walls, all to some extent make for impairment of the Motor subtest scores and hence of the Motor Efficiency Score. Careful observation by the examiner of the manner in which Motor subtests are taken by the subject will help to differentiate the Schizophrenic inefficiency from the motor-retarded Depressive inefficiency.

Table 77 presents the statistical analysis of the distribution of cases into four ranges of Motor Efficiency. It indicates that in spite of the above described lack of homogeneity of the three Motor subtests, clear-cut group differentiations nevertheless can be made by the MD. The Depressive Psychotics are significantly more impaired than all the other groups, having 100% of their cases with Motor Efficiency scores of "less than −2", and 60% of their cases with Motor Efficiency scores "less than −4". The next worst group is the Depressive Neurotics, who have 58% of their cases with Motor Efficiency scores "less than −2". These Depressive Neurotics show a slight trend to be worse than the Schizophrenics, and are significantly more impaired than the Neurotics or the Patrol.

The Patrol, in which 90% of the cases has Motor Efficiency scores "greater than −2", is significantly superior to the Schizophrenics. It also shows a tendency to be better than the Neurotics; these, although in general efficient, nevertheless have 10% of their cases in the range of greatest impairment, while the Patrol has no such cases. The breakdown of the Patrol into Depressive and Non-Depressive Normals shows no significant difference, indicating that the Motor Efficiency Score can be lowered only by the presence of pathologically strong depressive trends.

We conclude that (a) impairment of the Motor Efficiency Score is most directly related to the presence of depressive trends, and the severity of these depressive trends may be estimated by the extent of the impairment. (b) Some Schizophrenics may show up with poor Motor Efficiency, which may be related either to the presence of depressive trends in the schizophrenia, or to their erratic behavior on all tests, with a consequent impairment of the scores on the Motor subtest. Such impairment in the Schizophrenics is, however, not characteristic.

two subtests which did not differ from each other by more than 2 units in either direction, and (c) those cases who had a score on Symbol Digit more than 2 units lower than that on Sentence Writing. We see that the Depressives exceed all other groups by far in the incidence of cases with a much greater inefficiency on Symbol Digit; they are approached in this respect only by the Paranoid Schizophrenics. Conversely, in these two groups there are no cases who have a marked superiority on Symbol Digit.

Table 78-A presents these percentages in numerical form, and indicates that about 3 out of 5 Depressives show this specifically greater impairment on Symbol Digit than on Sentence Writing. The Paranoid Schizophrenics, the group closest to the Depressives in this pattern, have only about 2 such cases in every 5. In the other groups, the major part of the cases is in the "equal" range; but there is also an appreciable representation—especially of the Unclassified Schizophrenics—in the range of greater efficiency on Symbol Digit than on Sentence Writing.

TABLE 78-A.—*Percentage of Cases in Ranges of the Difference: Score on No. 5 Minus Score on No. 9*

Group	No. of Cases	Percentage of Cases		
		>+2	+2 to −2	<−2
U Sch	23	26	61	13
P Sch	19	—	63	37
Depr	17	—	41	59
Neurotics	40	15	70	15
Patrol	54	17	81	2

TABLE 78-B.—*Differential Significance of the Distribution of Cases*

Groups Compared	Chi² (d.f. = 2)	Significance
Depr : U Sch	11.38	<1%
Depr : P Sch	.97	50–70%
Depr : Neurotics	12.19	<1%
Depr : Patrol	33.41	<<<1%
P Sch : U Sch	7.44	2–5%
P Sch : Neurotics	5.63	5–10%
P Sch : Patrol	19.21	<<<1%

Table 78-B, presenting the differential significance of these distributions, shows the Depressives to be significantly worse than all groups except the Paranoid Schizophrenics; and the Paranoid Schizophrenics are seen to be more or less significantly worse than the Unclassified Schizophrenics, the Neurotics, and the Patrol.

This trend in the Paranoid Schizophrenics deserves a brief comment. We noted a similar tendency for this group to show great impairment on the visual-motor coordination subtests of the Bellevue Scale, especially on Digit Symbol. We see now, on the Babcock Test, this same tendency—that the Paranoid Schizophrenics to some extent follow the Depressives' pattern. The Schizophrenic pattern on the Babcock

Test, described above, therefore appears to hold true more for the Unclassified Schizophrenics—and this too was the case on the Bellevue Scale—while the Paranoid Schizophrenics, though essentially retaining the Schizophrenic pattern, manifest a depressive-like tendency for a rather generalized impairment of efficiency.

We conclude that not only by the Motor Efficiency Score, but also by the specifically great impairment of efficiency on Symbol Digit, the Depressives can be distinguished from the other groups; with the reservation that the Paranoid Schizophrenics, with their tendency to follow frequently the Depressive pattern, may also show a significantly great impairment of Symbol Digit.

The Symbol Digit subtest thus proves to be sensitive to certain types of maladjustments, and experience shows that subjects display a characteristic rhythm or tempo of performance. Consequently, we carried out an item-analysis on Symbol Digit, in the following way: as there are 5 lines of symbols to be filled in, and as we generally recorded the time taken to fill each of these 5 lines, we examined the frequency of great changes in speed on successive lines. We established the following limits: if the difference between the time required to fill in any two successive lines was greater than 6 seconds, we considered this a great change; however, in the case of the difference between the first and second lines, the limit was set at 7 seconds, as almost all cases show a more or less marked slowing down on the second line.

Table 79 presents the percentages of great variation in rhythm for our major groups the percentage being calculated from the ratio of the number of great changes to the total number of lines filled in by the whole group.[17] The Table shows that the greatest variability of rhythm occurs in the Depressives, who are followed by the Schizophrenics. In the Neurotics and the Patrol the incidence of such great changes of rhythm is very low. Statistically, the Schizophrenics and the Depressives are significantly more variable than the Neurotics or the Patrol; furthermore, the Depressives have a tendency to be more variable than the Schizophrenics.

We analyzed this variability from another angle: namely, in terms of the percentage of cases in the major groups having two or more great changes in speed on successive lines. The percentages of cases is closely parallel to that of the percentage of great changes, and the differences between the Schizophrenics and the Depressives on the one hand, and the Neurotics and the Patrol on the other, are again significant

We conclude that (a) not only great impairment of the Motor Efficiency score, and not only especially great impairment of Symbol Digit, but also a greater variability in the time required to fill in successive lines of Symbol Digit appears to be characteristic for the Depressives. (b) Only the Schizophrenics approach the Depressives in the extent of this variability.

---

[17] On a few of our cases we did not have an adequate recording of the time required to fill in each line; consequently, the number of cases in each group for which we analyzed this variability of rhythm is not identical with the number of cases previously dealt with in these groups.

TABLE 79-A.—*Frequency of Great Changes in Speed on Successive Lines of Symbol Digit*

Group	No. of Cases	Great Changes	Total No. of Lines	% Great Changes
(P + U) Sch	41*	31	164	19
Depr	17	20	68	29
Neurotics	39*	12	156	8
Patrol	54	11	216	5

TABLE 79-B.—*Differential Significance of Frequencies*

Groups Compared	Chi^2 (d.f. = 1)	Significance
(P + U) Sch : Depr	3.03	5–10%
(P + U) Sch : Neurotics	8.71	<1%
(P + U) Sch : Patrol	18.47	<<<1%
Depr : Neurotics	17.02	<<<1%
Depr : Patrol	34.83	<<<1%
Neurotics : Patrol	1.10	30%

TABLE 79-C.—*Percentage of Cases with 2 or More Great Changes*

Group	No. of Cases	Percentage with Changes
(P + U) Sch	41*	33
Depr	17	41
Neurotics	39*	10
Patrol	54	9

TABLE 79-D.—*Differential Significance of Distributions of Cases*

Groups Compared	Chi^2 (d.f. = 1)	Significance
(P + U) Sch : Neurotics	5.24	2–5%
(P + U) Sch : Patrol	7.53	<1%
Depr : Neurotics	5.23	2–5%
Depr : Patrol	7.24	<1%

* 1 Neurotic and 1 Schizophrenic did not have separate times recorded.

(c) Therefore, great variability of rhythm on the Symbol Digit subtest is diagnostic for Depression or Schizophrenia.

These results are especially crucial for the Schizophrenics, as the Depressives are easily distinguished from other groups by their retarded performance on this subtest. The Schizophrenics, however, show a tendency to have this great variability of rhythm without any significant total retardation of speed.

These are crude results on which to base inferences about variability of rhythm in different clinical disorders; but they do indicate, as a starting point, that variability of rhythm is greater in some groups than in others, and that further careful experimentation may reveal more significant group differences as well as some rationale of the psychological factors making for such variability.

6. *General Diagnostic Conclusions.* On the Bellevue Scale, we attempted to show that the patterns of inefficiency in different clinical groups are meaningful, and may be used for differential diagnosis. It was crucial for our analysis that we considered *patterns* of the scores and not the actual scores themselves. Similarly, on the Babcock Test we did not assume that our understanding of and diagnostic acuity for different clinical groups would be increased by considering the average total impairment; rather, we strove to detect *patterns* of impairment and efficiency. Where these patterns were in themselves not clear, or where they provided suggestive hints, we made detailed analyses of some of the subtests, and came to results such as the analysis of distortions in Story Recall and of variability of rhythm in Digit Symbol. In this section, we shall summarize the principal differential diagnostic findings that issue from the analysis of the Babcock Test.

(a) *The Schizophrenics.* In general these show their greatest inefficiency on the Learning subtests, and specifically on the Immediate and Delayed Story Recall. This inefficiency manifests itself not only by a low number of correct memories, but also by a high incidence of severe distortions of the story-content and even the introduction of bizarre material; further, the Delayed Recall appears to be much poorer than the Immediate Recall, having fewer correct memories and even more distortions. On the Repetition subtests—specifically, on Digit Span Forward and Digit Span Backward—the Schizophrenics (especially the Acute Unclassified) show a tendency to have a relatively well-trained Efficiency; it is this superiority of the Repetition Efficiency over the Learning Efficiency which is the most characteristic Schizophrenic Efficiency pattern, and a generally reliable basis for differentiating Schizophrenics from other groups. The Motor Efficiency of the Schizophrenics shows no striking impairment, and this finding is of crucial significance in differentiating the Schizophrenics from the Depressives. The most striking disturbance manifested by the Schizophrenics on the Motor subtests is the variability of rhythm on Symbol Digit without significant impairment of speed. As a result of their pattern of a well-preserved efficiency on some subtests and marked inefficiency on others, the Total Efficiency Scores (TD) of the Schizophrenics indicate only an intermediate extent of impairment, which is thus diagnostically inconclusive.

(b) *The Preschizophrenics.* The Over-Ideational Preschizophrenics are differentiated from the Coarctated Preschizophrenics by having a much better Learning Efficiency, with almost no incidence of severe distortions; such distortions are frequent in the Coarctated Preschizophrenics. Both groups, however, show significant increase of Efficiency in Delayed Recall, which clearly differentiates them from the full-blown Schizophrenics. However, these two Preschizophrenic groups follow the Schizophrenic pattern in that their Repetition Efficiency Scores tend to be superior to their Learning Efficiency Scores, even where the Learning Efficiency Scores themselves have not suffered marked impairment. In the Bellevue Scale we found this same trend to be true of the Preschizophrenics in the "out-of-pattern" relationship, where Digit Span was much better retained than Arithmetic. Otherwise no significant features of the Efficiency Scores of the Preschizophrenics were obvious.

(c) *The Depressives.* It is most characteristic of the Depressives to be greatly impaired on all the subtests of the Babcock Test. The extent of this generalized impairment is roughly parallel to the severity of the depression, being greatest in the Depressive Psychotics and less severe in the Depressive Neurotics. Consequently, the Learning Efficiency Scores of the Depressives may be as poor as those of the Schizophrenics. The distinguishing factors are the simultaneous great impairment of Repetition Efficiency, and especially of Motor Efficiency. It is this impairment of Motor Efficiency which most consistently differentiates the Depressives from all the other clinical groups, and the extent of inefficiency on the Motor subtests is also roughly parallel to the severity of the depression. Within the group of three Motor subtests, it is especially Symbol Digit which suffers severe impairment in the Depressives; and the evaluation of depressive trends may be most reliably made with reference to impairment on it.

(d) *The Neurotics.* The five Neurotic groups in some respects show homogeneous Efficiency patterns; in others, they follow different patterns. The two Neurotic groups most closely related to the Depressives—the Anxiety and Depression group and the Neurasthenics—tend to follow the Depressive pattern, having low Total Efficiency Scores, low Learning Efficiency Scores, and, in the case of the Anxiety and Depression group, even some impairment of

Motor Efficiency. In other words, where depression or depressive-like sluggishness is a concomitant feature of the clinical picture, the result will be a depressive-like impairment of all the Efficiency Scores. In general, the other Neurotic groups—the Obsessive-Compulsives, the Hysterics, and the Mixed Neurotics—have a much better retention of Efficiency than the depressive-like Neurotic groups described, except that the Obsessive-Compulsives show a mild impairment of Motor Efficiency. In these more efficient Neurotic groups, the Learning Efficiency is excellently retained; the amount of severe distortions in Recall is minimal; and although strong affects may encroach upon Memory Efficiency, the general retention of the pattern and meaning of the story will allow for the achievement of good Learning Efficiency Scores with no striking amount of errors. The greatest amount of affective distortion is found in the Hysterics. On the Delayed Recall the Neurotics improve considerably, in contrast to the Schizophrenics and the Depressives. It is therefore principally on the basis of Learning Efficiency that the Neurotics may be distinguished from the Schizophrenics and the Depressives; an additional differentiation from the Depressives lies in the more or less well-retained Motor Efficiency of the Neurotics.

(e) *The Patrol.* What has been said concerning the three more efficient Neurotic groups holds true for the Patrol, in greater degree. Learning Efficiency is more excellently retained; distortions in recall are minimal; great improvement on the Delayed Recall is rather consistent from case to case; Motor Efficiency is in general excellently retained; and only the Repetition Efficiency, under the impact of the anxieties present even in Normals, suffers impairment. The great stability of the Learning and Motor Efficiency Scores in Normals is further attested to by the fact that none of the Patrol breakdowns into Anxious, Schizoid, or Depressive groups showed any significant differences in Efficiency. The data on the Patrol indicate that as long as the Efficiency Score does not fall below -1, no impairment of Efficiency is indicated.

PART THREE

DIAGNOSTIC TESTING OF CONCEPT FORMATION

CHAPTER I

INTRODUCTION TO THE TESTING OF CONCEPT FORMATION

A. THE PLACE OF CONCEPT FORMATION IN THOUGHT PROCESSES

The illusion that human thinking consists of associations, in which that idea comes to consciousness which has the strongest associative bond to the one preceding it—the strength of the associative bond being determined by the frequency of contiguous occurrence—faded when subjected to careful psychological analysis. The death blow was dealt—as far as "public opinion" in psychology is concerned—by the discoveries of Gestalt psychology. However, even earlier the German schools of "Denk-Psychologie" had shifted attention to the rôle of attitudes and to the logical make-up of human thinking, and thus inevitably came to the problem of *concepts*. Genetic psychology and ethnopsychology used the analysis of the concepts of children and of primitives[1] in an effort to understand the development of thought-organization.

In the last thirty years there has been a steady growth of the recognition that human thinking is determined by the strivings, affects, wishes, and interests of the individual. Regrettably enough, there has been little quest after the missing link between concept formation, as one of the intrinsic formal characteristics of human thinking, and the determination of thinking by the individual's strivings and interests.

It is a generally assumed fact that emotional disturbances and personality disorders—maladjustment in general—encroach upon thinking. *How* this happens remains a great unknown. Yet a beginning must be made sometime. It is necessary to create a frame of reference, however hypothetical and vague, within which the observations and inferences concerning the nature of thought processes can be ordered and brought into relationship with each other. Only the ordering of the phenomena of thinking into a single frame of reference, and the assessment of relationships between them, can lead to new fruitful questions and hypotheses, and through these to a clarification of the dynamics of thought processes and an understanding of how maladjustment encroaches upon them. Without such a frame of reference, even an attempt at coordinating concept formation testing with general diagnostic testing is doomed to failure. Thus we shall advance a tentative one, with the understanding that at present there is no proof for the *necessity* of just this specific frame of reference, nor of the *existence* as dynamic entities of the functions hypothesized by it, nor of the *exclusiveness* of these hypothesized functions in the construction of a well-balanced frame of reference into which all phenomena of human thinking can be ordered.

---

[1] See in this respect H. Werner (31), Chapter IX, Pages 213–298.

We shall temporarily by-pass the dependence of the ideas emerging into consciousness upon emotions, affects, attitudes, interests, etc. This dependence of all ideas upon "psychodynamics" is a relationship sufficiently accepted; what is not clear about it are the rules of dynamics governing this "dependence". We suggest that this relationship will remain unexplored until we have much more knowledge about the phenomenological characteristics of "ideas". Thus, in the view of the present authors, the first step toward the understanding of the mode of dependence of ideas upon emotional dynamics is a *phenomenological* frame of reference for the understanding of the characteristics of ideas. It is not the single isolated ideas, but rather the general phenomenological framework of ideas whose interrelation with emotional dynamics can be attacked with any hope of success. We submit the following framework for consideration.

An idea once in consciousness can be characterized by its "identifiability". "Identifiability" has three facets. The first is that an idea is identifiable if it has reference to ideas which have been previously in consciousness, and which were either identical with or meaningfully related to the idea whose "identifiability" is in question. This facet of "identifiability" we refer to as memory—though this formulation of memory is a sweepingly general one.

The second facet of the "identifiability" of an idea is its "similarity to", "dissimilarity from", or "belonging with" other ideas. That is, for an idea to be "identifiable" it is not sufficient that it should have some meaningful connection to an idea which *before* has been in consciousness, but that this *connection* should also be clear. This facet of "identifiability" is usually referred to as concept formation—though, again, this view of concept formation is sweepingly generalized.

The third facet of "identifiability" is in a sense a quantitative one, and implies the ease or difficulty of "identifying". Ideas whose past references and "belongingness" are clear emerge into and are apperceived in consciousness without effort or selection, and in a sense passively. But when the past references of ideas must be deciphered, and their "belongingness" decided, effort, selection, and active orientation are required. In other words, the "meaning" of ideas either emerges effortlessly into consciousness, or must be deciphered by voluntary effort. In the previous chapter we considered these two types of functions of consciousness, and called the former *attention* and the latter *concentration*. Extending our discussion from single ideas to chains of ideas—that is, to ideas embedded in the continuous flow of conscious happening—it must be clear that the current flow of ideas "sets" or "prepares" our consciousness for the reception of the new idea. Such a preparation obviously facilitates effortless apperception of the meaning of the emerging idea. This "getting set" for the apperception of an oncoming idea was referred to as *anticipation*. The third facet of "identifiability" then divides into the functions of attention, concentration, and anticipation.

Thus, within this frame of reference, an idea can be investigated phenomenologically from three points of view: (1) memory; (2) concept formation; (3) attention-concentration-anticipation. We propose to deal with these as functions, but we shall not forget that they represent only a tentative structure for the phenomenological systematization of the outstanding characteristics of thought processes; and that for all we know they are merely three different ways in which human beings are accustomed to think about their thought processes. It should be also remembered that thought processes are such that they induce us to look at them now from one of these aspects, now from another. When our experience of a thought is, "I heard this before"—then the memory aspect is in the foreground, though here too it is possible and profitable to look at this thought from both other aspects also. When the experience is, "What could it be? It is a ship"—then the concept formation aspect is in the foreground. When the experience is, "The boss is smiling at me; it must be a promotion he is going to inform me about"—then the anticipation aspect is in the foreground. It is more difficult to give such sharply-defined examples for the attention and concentration processes; but it is evident that in any recognition of a known object or known idea there is an "attention" aspect, and in any solving of a problem a "concentration" aspect, in the foreground.

These different aspects are present in all thought processes, even though one may seem outstanding and thereby conceal the presence of the others. Accordingly, impairment on any of these aspects may encroach also upon the others. This is especially true of attention-concentration-anticipation, the disturbance of which is usually demonstrable even when memory or concept formation is the aspect in the foreground.

Here we are particularly interested in that aspect of thought processes referred to as concept formation, and which determines the "belongingness" of our ideas—that is, of the objects of *our world*—to each other. The meaning of concept formation which usually comes to mind is that taken from the point of view of logic—that is, the relationship between the concept "table" and the actually existing tables of our world. In introducing the concept formation tests, we shall open with a discussion of this logical view of concepts. This, however, is only a limited view; although it must be remembered that, if one draws the last conclusions from the logical viewpoint, the naming or identifying of anything must be considered "normal" concept formation corresponding to different modes of adjustment and to the types of intelligence functioning they imply.

Still, the notion of logic concerning concept formation is the conceptual ideal of our civilization. "Table" should not mean for us merely a "place to eat at" or "the thing that has legs and a plate" or "the thing that the carpenter makes", but a composite of all these and more. Yet we expect the average individual of our civilization to use this composite flexibly, and not to think always of *one* certain table or tables *in general*, but in different situations to think relevantly of tables and to be able to segregate out of the all-exhaustive *content* of the concept more narrowly-defined contents also. We expect the average person of our civilization not to bring a tiny shred of paper if somebody wrapping up a good sized package calls for paper. The everyday expectations thus are much less rigid than the notions of logic concerning concept formation. This will become even more clear if we consider the process of concept formation itself.

From the point of view of logic, a concept has two variables, realm and content. To use a simile of mathematics, two types of problems can be set up, each solvable for one of the variables as an unknown. In the first problem, the realm of the concept can be given and the content is the unknown for which the problem is to be solved: as when many objects are given, and their *identical color* is to be discovered. In the second problem, the content is given and the realm is the unknown to be found: as when many objects are given for which only the *tools* are to be selected. The first problem is described by logic as one requiring *induction*, and the second as one requiring *deduction*. In the first, one must reason from the actual individual cases to their common uniting principle, which should be an eminently empirical-inductive procedure; in the second, a principle must be applied to find a result that fits it. In a system of logic that operates in a world of abstract ideas, the first task can be solved purely by induction and the second purely by deduction; but in everyday life, this is not the case. Realms are never given alone but rather intermingled with other realms, and we usually want to determine content for the purpose of segregating realms. Thus, the content should not only unite all the objects of the realm but also segregate them from objects not belonging to it; and since to exhaust all the common features of the objects of a realm is a task without end, usually only those common features necessary and sufficient for segregating the realm from the not-realm are included in the content. Thus, practically we always make some kind of an induction on the basis of the objects of the realm; the resulting content can be then immediately used for deduction to ascertain whether the content arrived at covers all the objects of the realm and whether or not it includes objects that do not belong to that realm. In either case, the omitted or added objects, as well as the objects to be omitted or added, are taken into consideration in a new induction; and this process of interchange continues so long as an adequate concept is not arrived at. This process is very clear in the development of any science; it is also encountered in everyday life situations, but as a rule it is an automatic process of concept formation which goes on unnoticed, and of which we become conscious only when the conceptual problem confronting us becomes too difficult. The situation is similar with the problem whose solution starts as a deductive process. In the minds of the present authors the interaction of induction and deduction is so universal that it appears to justify the contention that the elementary units of thought processes are not induction and deduction; these are rather artifacts of abstraction isolated out of "concept formation", which appears to be the basic unit of thought processes, in which induction and deduction occur indivisibly integrated with each other.

The balance of inductive and deductive steps—or the balance of the regard for the objects of the realm and for the content of the concept—cannot be treated by means of mechanical rules, and has to be conceived of as a dynamic equilibrium which changes with the changing context in which concept formation occurs. A content as expressed in a verbal abstract symbol is dependent on the constellation in which it is called upon to play a rôle, and is not a rigid pre-existing archetype. A steady approximation to each other of the objects of the realm and the content is the life of a concept, or concept formation. If this were not the case, everything could belong with everything, since each thing has so many features that some similarity can be found between any two; or only identical things could belong with each other, since things have so many features that some dissimilarity can be found between any two. In this case, no concepts at all would be formed, everything would remain isolated, and different names for each and every single object would render thinking cumbersome and dead. The former extreme is approached in the schizophrenic process, the latter in mental deficiencies of various origins.

C. THE PLAN OF PRESENTATION AND THE APPROACH TO CONCEPT FORMATION

In this section our plan is to discuss first the Similarities subtest of the Bellevue Scale, which is one of verbal concept formation, then the Sorting Test, and then the Hanfmann-Kasanin Test.[3a] Finally, we shall compare performances on the three.

The nature of our analysis of these tests will be quite different from that of the two intelligence tests discussed in Part Two. There we centered our attention primarily on the relationship of the scores of the subtests to each other—that is, upon scatter. The concept formation tests, however, do not have subtests and thus no internal scatter analysis can be made on them. Even the comparison of performances on the three can be made only in qualitative terms, because the results of the Hanfmann-Kasanin Test are not expressible in quantitative terms; and even though the results of Similarities and the Sorting Test are so expressible, their quantities and implications are of such different natures that they are not directly comparable.

[3a] The history of this test, to be summed up in Appendix III, shows that it could be justifiably called the Ach-Sacharov Vigotski-Hanfmann-Kasanin—etc. Test.

On the Bellevue Scale, we made item-analyses of the subtests; that of Similarities will be relevant here. The Hanfmann-Kasanin Test, however, does not have "items", but is a unitary whole; and though the Sorting Test has two parts consisting of well-defined items, it lends itself only to a very general item-analysis. Accordingly, our analysis of these tests will follow lines in the main different from scatter- and item-analysis. This new approach was forecast in the earlier analysis of Similarities. A part of our discussion there was centered on the fact that the performance on each of the items may occur on different "levels": concrete, functional, and abstract-conceptual. In these three tests of concept formation, we shall be interested mainly in the types of solutions and the conceptual levels on which they occur; and though the success and failure of concept formation will also come into question, it is mainly its *quality* which will be emphasized in this Part.

The three tests represent three different types of concept formation.

The *Similarities* is a purely verbal test, which can be responded to by virtue of the verbal coherence between the names of the things to be compared and the verbal symbol for their abstract conceptual category—such as *orange–banana*, "fruit". If the conceptual thinking of the patient has never developed to that degree at which this verbal coherence is achieved, the patient will remain on a concrete or a functional level of concept formation; but if an abstract-conceptual level has once been reached, it may persevere in spite of subsequent deterioration of concept formation. We have demonstrated the existence of such perseverance of verbal achievements on the Bellevue Scale.

The Sorting Test deals with everyday objects usually known to the subject; thus we gain insight into how the patient crystallizes the "belonging-together" of the objects of his everyday world. Here too it is possible for verbal convention to conceal essential impairment of concept formation; but on this level such impairment manifests itself early.

The Hanfmann-Kasanin Test confronts the subject with a new conceptual problem, where such verbal images as may be available to the subject—names of colors, geometrical forms, dimensions—are of relatively no assistance; and everyday acquaintance with the test-material is absent. Here concept formation presents itself on a problem solving level, since the characteristics of a group of objects must be explored *in the testing situation*, and must be abstracted into new concepts. As new concepts are not created from "nothing", but usually by re-combination of elements of old concepts, a factor of information and of otherwise well-organized concepts enters the solution of the Hanfmann-Kasanin Test. Thus, the test is not merely an indicator of adjustment or maladjustment, but also of the strength of intelligence- and conceptual-development. It is often difficult to distinguish between these. However, certain procedures and aberrations in the course of performance can be definitely segregated as pathological, or as indicative of certain personality characteristics.

Thus, while Similarities is a test of verbally-stereotyped concept formation, and the Sorting Test is a test of everyday concept formation, the Hanfmann-Kasanin Test may be considered to be a test of "basic concept formation"—that is, concept formation in productive action, rather than in the chore of reproducing previous verbal or experiential stereotypes.[3b] Successful solution of the Hanfmann-Kasanin Test implies a well-developed conceptual ability capable of performing without support of verbal or experiential stereotypes. Thus although concept formation is encountered here in its basic creative form, it is not basic in the sense that it is performed by all persons in daily activity, or in the sense that more superficial concept formation need show the effects of its disorganization. Failure on it must be taken with caution; it may not always indicate pathological impairment. For this reason helps and clues are used in the Hanfmann-Kasanin Test; the personality is seen in action at solving the new conceptual task, and in its reaction to help given by the examiner, to failure, and to frustration in the course of conceptual performance.

In all these three tests the examiner must keep in mind that the patient's verbalization may serve more to conceal than to reveal his real level of concept formation. By introducing all three tests into our battery, conceptual *performance* can be compared with conceptual *verbalization*. But conceptual performance can be also misleading; and it is rather the relationship of verbalization to performance that will be most crucial and instructive. Insistence on performance *and* verbalization, and inquiry into every doubtful shading of either, is the only method whereby diagnostic concept formation testing can be practiced.

[3b] The expression "basic concept formation" has a certain ambiguity, because it may lead one to disregard that in our everyday life we do not perform concept formation without aid of verbal or experiential stereotypes. It is rather the scientist who does so, and even in his work this is the exceptional case.

CHAPTER III

THE SORTING TEST

A. INTRODUCTION

1. The Problem. The general clinical application of the Sorting Test[1] and the investigation of its diagnostic potency is the most directly "experimental" problem we have tackled in the research reported in these volumes. Clinical application of the Sorting Test has been in general limited in the past to the study of the impairment of "abstract attitudes" in organic and schizophrenic cases. These investigations have presented only qualitative analyses of the characteristic performance of these two types of subjects.

The Test appeared to the present authors to have potentialities as a diagnostic tool, within the framework of the understanding of thought processes and their impairment by maladjustment discussed above. We attempted to put it to such use. In order to use any test as a diagnostic tool, the following criteria must be met: (a) a scoring system must be devised which will allow for direct comparison of a subject's achievements on the different items, as well as of the achievements of one individual with those of others; (b) the scoring system must be shown to differentiate between different types of maladjustment and adjustment; or in other words, its clinical validation must be undertaken. These were the two major tasks confronting us. In the course of validating this test we undertook a developmental study of concept formation[2] using this test as a tool; this study shed light on the test and helped to develop the scoring system. To this developmental study we shall refer repeatedly.

Our analysis of this test is by no means complete; there is much of importance in the data we collected that was not investigated, because in breaking fresh soil we preferred to be cautious, and to let the first results indicate what should be done next. These results, therefore, indicate merely gross, major differential findings.

2. The Plan of the Chapter. In this chapter we shall first of all describe the material and gross structure of the test; we shall then present a psychological rationale of the test as a whole, together with a rationale of the scoring system we have developed and its implications for the pathology of thinking; this will be followed by a discussion of the technique of administration, a qualitative analysis of each of the items of the test with a few pertinent quantitative findings, and finally a statistical evaluation of our material. Throughout these discussions reference to everyday thinking will be made as much as possible, in order to demonstrate that our innovations have their roots in the observation and the systematization of thought processes as actually encountered daily.

---

[1] Goldstein and Scheerer (11).

[2] See Reichard, et al. (24).

3. A Description of the Test. The test materials consist of 33 objects common in everyday experience. These objects are: a real knife, fork, and spoon; a miniature knife, fork, and spoon; a real screwdriver and pair of pliers; a miniature screwdriver, pair of pliers, hammer and hatchet; two nails; a block of wood with a nail in the center of it; two corks; two sugar cubes; a pipe; a real cigar and cigarette; an imitation cigar and cigarette; a matchbook; a rubber ball; a rubber eraser; a rubber sink stopper; a white filing card; a green cardboard square; a red paper circle; a lock; and a bicycle bell.

The test is divided into two parts, each presenting the subject with a different type of conceptual problem. Part I consists of 7 items. In each of these, one object is put before the subject and he is asked to find which of all the remaining objects "belong with it." In all but the first of these items a standard initial object is placed before the subject by the examiner; in the first item the subject is asked to pick any of the objects at random. After the subject finishes his grouping he is asked, "Why do all these belong together?" Thus, in Part I the subject's task is to form conceptual groups (realms) and define them (state their content).

Part II consists of 12 items. In each item the examiner places before the subject a group of chosen objects and asks, "Why do all these belong together?" Each such grouping implies an abstract-conceptual definition of the objects in it, such as "eating utensils", "smoking equipment", "toys", and so on. Frequently the same objects will be included in several different groups, and in each a different attribute of the object is relevant. For instance, the red rubber ball is included with the "red" objects, the "toys", and the "rubber" objects. Thus, in Part II the subject's task is to define groups (state the conceptual content of realms) put before him by the examiner. The implications of the difference between the types of problem in Part I and Part II will be discussed in the section on rationale.

The subject's groupings and his verbalizations are recorded completely on a blank which has ample space for detailed notes on both his behavior and side-comments. The groupings and the definitions are both evaluated, and the scores written alongside the responses. No total score has been developed by us; there are only 19 items on the entire test, and our scoring system is designed simply to make the scores easily surveyable at one glance down the scoring column.

B. THE PSYCHOLOGICAL RATIONALE OF SORTING BEHAVIOR, OF THE SORTING TEST, AND OF SCORING

1. Sorting Behavior. Sorting behavior, in response to the instruction to "put together those which belong together", is an expression of concept formation. It may take both the form of actively putting together those objects that "belong together", and the form of discovering why the objects put together "belong together".

Sorting behavior can be considered as understood only if the actual sorting (whether by examiner or by the subject) and its verbalization (by the subject) are both extant; impairment may encroach either on verbalization or sorting, and is usually a disturbance of the relationship between the two. This is precisely what makes the Sorting Test a more sensitive test of concept formation than Similarities: it makes possible a comparison between sorting and verbalization (the realms created and the definition of their content). In purely verbal tests of concept formation, the actual realm of the concepts in question is present only in the mind of the subject: thus on the one hand, memory and attention-concentration-anticipation play a strong rôle together with concept formation; and on the other, the comparison of the realm with the content is more difficult.

Sorting behavior, wherein the subject compares objects that belong to the realm and objects that do not belong to the realm, gives the examiner an opportunity to assess how rigid and concrete (narrow), or how fluid, vague and over-generalizing (loose), the concept formation of the subject is.

Finally, sorting behavior and its verbalization indicate whether the subject's concept formation is on a concrete, functional, or abstract-conceptual level.

Insofar as sorting behavior pertains to the "belonging together" of objects in terms of their objective characteristics, it reflects concept formation proper to conscious ordered thinking. The pathological variations of this kind of sorting behavior we shall discuss below in detail. Insofar as sorting behavior pertains to the "belonging together" of objects in terms of value-judgments (useful—useless) or of affective value-judgments (good—bad, pleasant—unpleasant, liked—disliked) or of aesthetic value-judgments (beautiful—ugly, tasteful—disgusting), it approaches that type of concept formation proper to unconscious processes. Signs of this kind of sorting behavior in the course of performance are conspicuous and, not being pertinent, are to be considered as diagnostic signs, indicative of either queer and rarely-encountered adjustments or of deteriorative maladjustment; however, in children they may occur at pre-school age with considerable frequency. Such sorting behavior will not be included in our considerations. But the genetic relationship between these two types of sorting behavior should be recognized: the steps between something which is "good" or "no good", and something which is "good for playing with" or "no good for playing with", and something which is "toy" or "not toy", are indeed short; and observation of young children shows that this is not merely a logical connection, created *a posteriori*, but rather corresponds to developmental stages.

2. The Sorting Test. The Sorting Test, by virtue of the nature of the material it uses, pertains to concept formation as exercised every day by the human being of our civilization. As a matter of fact, the test shows how a human being sees the segment of the world of objects, and the interrelationships in it, which surround him daily. All human beings call objects by generic names: a knife a knife, a fork a fork, and a spade spade. Whether, and to what extent, the concepts behind these generic names are identical for all human beings, and, if not identical, in what respects they are inter-individually different, can be assessed only by creating a map of the actual interrelationships of objects as seen by different subjects. The Sorting Test charts this kind of map of the interrelationships of 33 objects. For this reason, the concept formation tested by the Sorting Test is referred to here as "everyday concept formation".

Part I of the Sorting Test pertains to *active* (sorting) concept formation; Part II to *passive* (understanding) concept formation. In Part I the subject actively displays how *he* sees the conceptual interrelationships of objects; in Part II, where the common conceptual content of a group of objects must be determined, the conventionalized "understanding" factor plays the main rôle, and we are much nearer the verbal concepts. However, whereas in Similarities we derive the common content from *abstractions*, in the Sorting Test the *objects* with their manifold properties are before the subject; accordingly, there is a greater chance for him to bog down among the many attributes of the objects. The Sorting Test is thus more vulnerable to maladjustment.

In an earlier study[3] we have shown that, in the course of childhood and adolescence, the accuracy of active (sorting) concept formation develops earlier than the accuracy of definition in passive (understanding) concept formation; but the quality of sorting tends to remain on a more primitive conceptual level in the active part of the test than the quality of definitions in the passive part. One could designate the function implied in Part I as "active", and in Part II as "compliant", everyday concept formation. Using these expressions, we may say that our earlier study showed that active concept formation becomes accurate earlier than compliant concept formation, but remains more primitive in its conceptual level. Apparently, Part I is more like a map of the conceptual relationships as subjectively experienced by the subject; and it is Part II wherein concept formation tries to meet the logical ideals of our society, which requires highly-conventionalized concepts in harmony with the conceptual standards of our society. These conceptual standards apparently remain confined to passive understanding, while our everyday actions are directed by an active concept formation which is conceptually on a lower level.

---

[3] See Reichard et al. (24).

In the discussion of the scoring categories of the Sorting Test, we shall go further into the details of the relationship of the two parts of the test.

3. The Process of Sorting. On Part I the active sorting process begins on the sample object. The subject determines its conceptual content. On the one hand, this process may have abstractive, inductive characteristics, as when the sample object is "green and cardboard and square"; on the other hand, it may be merely a process of subsuming the sample under its generic term, as when "tool" covers the sample object, pliers. Once the conceptual content is established by either process, the next step is deductive. That is, the conceptual content arrived at is applied as a selective principle upon the other objects, to segregate from them those which fit best the content. In the course of this deductive process, the subject may encounter three situations: (a) The content defined for the sample selects a well-defined and sizable realm of objects, well-differentiated from all the other objects. (b) The subject finds that few or no objects fit the conceptual content in question; consequently he either fails, or makes a narrow concrete grouping, or finds other objects from which, by inductive reference to the sample, he derives a more inclusive or different conceptual content, which is then applied deductively to all the objects of the test and yields a satisfactory sorting. (c) He may hit immediately upon test-objects which, in conjunction with the sample, appear to make a more relevant sorting; this leads to an inductive process out of which a new conceptual content, either radically different from or merely a modification of the original one, may issue, and the subject then applies this deductively to the objects of the test. These processes may re-occur repeatedly, with an interchange of deductions and inductions, before a final sorting is arrived at. It is always the interaction of the apparent conceptual content of the sample and the test objects which determines the final sorting.

Similarly, in Part II, the first attempt at a definition is based on one of the common features of the group itself; this conceptual content is then checked against the other test objects to see whether it sufficiently excludes them. In the determination of the conceptual content of the group, interacting processes of induction and deduction have already taken place. The more homogeneous the group is at first glance—that is, the more familiar and stereotyped its conceptual content—the less consciously perceived these processes become.

4. The Rationale of Scoring. In the attempt to make the Sorting Test a diagnostic tool, we developed a scoring system to take account of both *sorting* and *verbalization.* Specifically, we scored: (a) the *adequacy* of sorting and verbalization—that is, to what degree the sortings or verbalizations approximate or deviate from the norm on that item; (b) the *conceptual level* of the verbalizations—that is, whether the definition of the group was on an abstract, functional, or concrete level; (c) the *concept span*—that is, the patient's regard for all the objects in the test, and whether he omitted or included too many objects in the group he sorted, or whether his definition of a group did account for all the objects in it or accounted for objects not in it.

We attempted to make our scoring such that Part I, involving active concept formation, and Part II, involving passive concept formation, should be directly comparable. On Part I the sorting itself is scored both for its adequacy and its span, and the verbalization is scored for its adequacy and its conceptual level. The scoring of "adequacy of verbalization" was introduced here in order to obtain an adequacy score which would be directly comparable to the adequacy score of verbalization on Part II. Statistical analysis shows that the adequacy of sorting and the adequacy of verbalization on Part I do not essentially deviate from each other; thus, though our general tables present scores of both adequacy of sorting and adequacy of verbalization, our statistical analyses will refer merely to the adequacy of sorting. On Part II, where no sorting performance by the subject is required, only the adequacy of the verbalization, the conceptual level, and the concept span are scored. The concept span is here a much more limited scoring category than in Part I.

(a) *The adequacy of sorting and verbalization.* A sorting is adequate if all the objects put with the sample object are relevant to it. The verbalization of a sorting is adequate if it gives a sufficiently inclusive and exclusive definition of the group of objects to which it refers, whether this group was selected by the subject or the examiner.

Adequate Sorting. If the sample is a rubber ball, and the subject puts all the rubber objects (rubber cigar, rubber cigarette, rubber sink stopper, and rubber eraser) with the sample, the sorting is adequate. It is quite unusual to group all the round objects with the rubber ball; nevertheless, this also is considered an adequate sorting, because it segregates a well-defined, sufficiently large realm. Thus, adequate sorting is a grouping which is (a) relevant to the sample object; (b) so common that it must be accepted as normal; or (c) though rare, clearly intelligible and based on a well-accepted concept which segregates clearly a sufficient number of objects. Such adequate sortings are allotted the score "+".

Inadequate Sorting. In the discussion of this category, we shall omit inadequate sortings referable to disturbances in the concept span or conceptual level. Inadequate sorting is that which is irrelevant to the sample object. An example is grouping the small silverware with the big table fork and omitting the rest of the big silverware; this disregards the differences in size and "purpose" between the sample and the sorted objects. Grouping the green cardboard square with the small green-handled hatchet is also an inadequate sorting; it disregards the fact that the sizable group of cardboard and paper objects would make a more relevant grouping. In other words, inadequate grouping is one not relevant to the sample object, and not taking into account the other objects at the subject's disposal. Inadequate sortings are allotted the score "−".

If an adequate sorting is made, but an essential object is omitted or an irrelevant object added without affecting the general idea of the sorting—as established from the verbalization—the sorting is scored "±". If a reasonably adequate sorting is seriously affected by the addition or omission of one or two objects, or if an inadequate sorting has some lucid features to it, the sorting is alloted the score "∓".

Adequate verbalization. A verbalization is adequate if it covers correctly the group sorted. In grouping the green square with the green-handled hatchet—though an inadequate sorting—the verbalization that "both have the same color" is considered adequate. Thus, the adequacy of verbalization must be distinguished from the adequacy of sorting. This is an unusual case; usually adequate verbalizations match adequate sortings.

Inadequate verbalization. Definition of all the rubber objects as "all having some red on them" is an inadequate verbalization; reference to the other objects would have shown red objects outside the group, and indicated the necessity of a different principle. In the majority of cases, where the sorting is inadequate the definition will be inadequate also. However, there are cases where the grouping will be adequate and the verbalization inadequate; these may indicate malignant disorganization. A relatively mild instance of this type is grouping all the toys with the definition that "they are all small", or with the more malignant definition that "they are all used to break something".

The adequate verbalizations are scored "+"; the inadequate ones are scored "−"; small peculiarities or deviations in otherwise adequate definitions are scored "±"; inadequate verbalizations with some glimmer of the correct idea are scored"∓".

(b) *The Conceptual Level of Sorting.* The notion of conceptual levels has been already advanced in the discussion of the Similarities subtest. There we discussed the concrete, functional, and abstract-conceptual levels in verbal concept formation. We shall not duplicate that discussion, beyond stating that on the first level the subject considers things as belonging together because of a concrete attribute they have in common; on the second level the subject considers things as belonging together because of a function they have in common, or because of a common function performed with or on them by human beings; on the third level the subject expresses their essential abstract-conceptual common content in a generic term.

The conceptual level in the Sorting Test is determined mainly on the basis of the verbalization of the subject. The subject who groups the tablespoon and the table knife with the big fork appears to be operating on an abstract-conceptual level; but by verbalizing this sorting as "we eat with them" or "they are all on the table" he reveals that his concept formation lies really on the functional or concrete level. At times, however, the sorting itself will be more revealing than the verbalization. Thus a subject who groups the sugar with the table utensils, and defines them all as "tableware", reveals by the grouping rather than by the verbalization that his abstract-conceptual level of concept formation is impaired.

Definitions on the concrete level of concept formation are scored *C* (concrete); on the functional level *FD* (functional definitions) and on the abstract-conceptual level *CD* (conceptual definitions).

Four types of definitions which are more or less related to the functional and concretistic levels of concept formation, but which are definitely pathological indicators, should be discussed separately. These are the syncretistic (S), the fabulated (Fab), the symbolic (Symb) and chain (Ch) definitions.

Syncretistic definitions may use a functional or a concrete attribute common to the objects of the group to be defined, and thus may be similar to functional and concrete definitions. On closer scrutiny, however, the function or attribute in a syncretistic definition is so vague and generalized that it includes many other test-objects not present in the group. Syncretistic definitions of the functional type are: "We use them all", "They are all manufactured", "They all give us pleasure". Syncretistic definitions of a concrete type can be divided into several groups; those referring to location, to origin, or to the "belonging" to something or someone, are the most frequent. Examples are: "They can all be found in the house"; "They all come from plants"; "They all belong to men". It is characteristic of all the syncretistic forms of concept formation that the concept basis or common link becomes tremendously extended so that everything may belong with everything.

In the syncretistic groups there are other types of conceptualization also, which are more difficult to label systematically. One of these is seen when the subject groups a number of unrelated objects by re-interpreting several of them into things which they are not, and thus creating some kind of "set". Such "sets" lead us, partly by their fabulated character and partly by the symbolic meaning given to the objects, to two other types of definition.

Fabulated definitions start out with one attribute of one object, and make it the starting point of a story which then unwinds so that in its course reference is made to all the other objects in the group. Thus, it is not *common* conceptual content which unites the objects, but rather attributes in which they *differ* from each other and which figure as different parts of one story. Thus, a subject will start out with the sample "big screwdriver" as belonging to a workman, and will add the rest of the tools, relating the different kinds of work he does with them; then the sugar and eating utensils are added with the explanation that the workman went to lunch; the lock is added, because he locked up his toolkit with it while lunching; and finally all the smoking utensils end up in the group, either by way of giving the workman a choice, or because he likes to smoke a cigarette when he does heavy work, a cigar when he does easy work, and his pipe after lunch. Sometimes fabulations are innocuous looking; but their presence should always be considered a serious pathological indicator. Fabulated sorting usually appears similar to definitions on the functional level, but can be distinguished from them by the fact that it is not identical functions of the objects but a narrative into which they are woven which unites them. Fabulatory concept formation is an extreme of the concrete type, however functional it may look. In it all the objects are isolated and lack any relationship to conceptual contents of other objects; they are chained together only by extraneous stories.

Symbolic definitions re-interpret radically the meaning of the objects, and make an arbitrary symbolic meaning the basis of sorting. This type of sorting not only interprets a round piece of paper as an ashtray and a square piece of paper as a table; but will join the large and small silverware under the verbalization, "mother and child". The Symbolic sorting is a sign of the encroachment upon consciousness of the "affective-evaluative" type of concept formation.

In *Chain* definitions the sample object may be red, and another red object is put with it; this being rectangular, a rectangular wooden block is then added; then a tool which has a wooden part is put in; this induces the addition of another tool; and so on. Here concepts are formed, in a sense, on a concrete level of concept formation, but because of a generalized disturbance the concept becomes fluid; from one moment to the next there is no retention of the conceptual frame of reference, and perhaps not even of the memory of the first principle. The result is a chain-like performance which, though resembling the fabulated performance, reveals thinking characteristics which are more warped.

(c) *Concept Span.* A working definition for adequate sorting and verbalization might state that adequate sorting includes all the objects that belong with the sample, and excludes all the objects that do not belong with it. Sorting which includes objects that do not strictly belong will be considered as *loose*; and sorting which does not include objects that do belong will be considered as *narrow*. Subjects who sort *narrowly* usually arrive at their conceptual content on the basis of the sample, and even if they find few or no objects which fit this content, they will not modify it but will rigidly stick to their deduction. Thus, they may decide that the ball is "red, round, and rubber"; consequently they will group only the sink stopper with it. Those subjects who sort *loosely* usually let themselves be led to inductions by the objects of the test, and their urge extends to further and further inclusions. Thus, they may find other small tools to go with the small pliers, then the big tools, then the nails and the block of wood, and finally even the lock.

Ideal conceptual behavior, as already stated, unites inductive and deductive processes, because neither alone will make for adequate concept formation. Conceptual balance between inductive and deductive processes is seen in the sorting behavior when equal weight is given to the available objects and to the sample. This is implied in the testing situation as a *tacit* instruction, and though it is never made explicit, normal subjects understand it. The deviations from this balance are significant; and the test-behavior of the subject—his centering upon the sample alone, or always discovering additional objects to be sorted—in itself expresses his tendency to deviate from the balance in one or the other direction.

Narrow sortings result not only from a rigid adherence to a preconceived decision, or from the logical-deductive rigidity frequently seen in compulsive, over-meticulous, pedantic persons who find that most or all of the other objects do not fit the sample because of small—but to them significant—differences. A different origin of narrow sortings—the extreme of concretistic thought, shear inertia and/or uninterestedness—is seen in some of the Depressive Psychoses, in the Deteriorated Schizophrenics, and in the Neurasthenics. It is not possible for an objective scoring to differentiate the types of narrow sorting; but the test behavior and verbalizations of the patient often reveal which it is.

Loose Sorting. We differentiated between three degrees of looseness. The score "l" was given to mild loosenesses, such as grouping the sugar with the silverware. In these cases it was stipulated that the looseness should not be sufficient to disrupt the conceptual level of the verbalization. This type of sorting occurred so frequently in the control group that it could not be considered to have pathological significance.

The score "(L)" was given to loose groupings where the conceptual character of the verbalization has suffered under the loosening of the concept, but is not altogether out of bounds. An instance is the grouping of the lock with the tools, "to lock the tool kit".

The score "L" was given for essential loosenesses. An example is the procedure of a Preschizophrenic who grouped with the ball all objects which had the slightest roundness. Thus, the knife was included because its end was rounded, the nail was included because its head was rounded, and so on; and so almost all the test objects were put with the ball. A loose grouping need not consist of a great number of objects: if the fork and the small pliers are placed together because "you pick things up with both", that is also an essentially loose sorting. In other words, the looseness of the sorting is determined not only by the number of objects, but also by the lack of their "belonging together". The more flagrantly the sorting departs from the usual sorting, and the more the verbal definition departs from the usual verbal definition, the looser the sorting must be considered. Sortings on any conceptual level may be loose, but only the active sorting (Part I) may be scored l, (L), and L.

Narrow Sorting. The score "N" was given to essentially narrow sorting. This was the case when the concept derived from the sample excluded all or all but one or two objects, even though with less rigidity or more interest in search others could have been included.

The score "(N)" was given to sortings where the grouping was good and its definition relevant, but one or two objects which should have been included were omitted. The cause is usually carelessness, unconcern, or over-meticulousness.

"N" scores are most frequently obtained where the sample object is the bell. "(N)" scores are most frequently obtained where the adequate sorting should include imitations—such as the rubber cigar with the smoking equipment—and the subject omits them.

These scores pertain to active concept formation, and thus were given only on Part I. On Part II, narrowing of the concept span results in splitting the groups sorted by the examiner, and in defining the subgroups separately. This procedure is labelled "split-narrow," and scored "S/N".

C. THE ADMINISTRATION OF THE TEST

The administration of this test may be discussed under two headings: instructions, and inquiry. In the instructions, the essential point is a strict adherence to the formulation presented below. In the inquiry, the essential point is caution, a noncommittal tone of voice, and the avoidance of any leading questions.

1. Instructions. On the first item of Part I, the examiner says, "Pick out any one of these objects; it doesn't matter which one you choose."

When this has been done, the examiner continues, "Now pick out all those objects which belong with it, and tell me when you are finished." This latter point precludes subjects' inferring from the examiner's demeanor whether or not they have correctly finished the task. When the subject announces that he is finished, the examiner inquires, "Why do they all belong together?" On the second to seventh items, the examiner selects the sample object[4] for the subject and instructs him, "Put with it all that belong with it."

On Part II the examiner selects and puts a group of objects before the subject, with the instruction, "Now tell me why all these belong together." The procedure for all 12 items is the same.

2. Inquiry. Inquiry should be restricted to a minimum sufficient to clarify the subject's response. Questioning frequently gives the subject the feeling that something is wrong, and he may then change his grouping, alter his response, offer several alternative responses; and the result will be an unscorable tangle of the correct response in a variety of irrelevancies. Where questioning is necessary, the wording and the tone of the question should give the subject the impression that what is wanted is merely amplification and clarification of what he has said, not modifications, corrections, or rejection of the original response.

It would be ideal if inquiry could be postponed until the test is done,[5] because inquiry may not only induce modification of the response but influence the subsequent sortings and verbalizations. On the other hand, it is often quite difficult to find out later what the subject had in mind. It is up to the examiner to strike a balance between these advantages and disadvantages.

Inquiry is usually necessary on the following occasions: (a) When the definition of the group obviously does not take into account all the objects in the group, the examiner should ask the subject, "What have these objects to do with it?" (b) When the definition remains vague in relationship to the group or is contradictory to it, the examiner should ask, "It is not quite clear to me what you mean; would you explain it?" (c) When the subject subdivides a group put before him and defines the subgroups separately, the examiner should ask, "But why do they *all* belong together?" (d) When subjects state that they see nothing that belongs with the sample object, the routine procedure is to say, "My question was *which* of these objects belong with it." The item is considered failed only if the subject refuses to respond after such a suggestive instruction. (e) When subjects state on Part II, "They do not belong together", the routine procedure is to say, "My question was why *do* they belong together." The item is considered failed only if the subject still finds no answer. (f) Responses which appear to be nonsensical should not be inquired into until after the test has been completed. It should be determined whether the nonsensical response can be satisfactorily rationalized, or whether it is completely indefensible; and whether the subject can be made aware by questioning that his solution was wrong, or whether he will stick to his bizarre response. Results of such inquiry should not influence the scoring, which is always based on the spontaneous definition given by the subject. Such questioning should not be done during the test because it may put the patient on his guard, make him realize his verbalizations are not correct, coherent, or acceptable, and result in a covering up of his pathological thinking; thus the test results will be meaningless. (g) The subject frequently asks, "Is that right?" In such cases the examiner should say, that it is not a question of right or wrong, but that he is interested rather in which objects the subject considers to belong together and why. In general, the examiner should not indicate during the course of the test whether a response was satisfactory or not; this may not only give the subject clues as to the preferable kind of response, but may preclude the possibility of retesting at a later date when correct answers may be remembered.

---

[4] For the sequence of the sample objects see the section on item analysis.

[5] Inquiry about Part I cannot be postponed until Part II is completed, because the latter contains part of the answers to the former.

3. Further Remarks on Administration. Subjects often make a grouping with their chosen sample which will later be required of them again. Thus, a subject may pick the large screwdriver as the sample object, and make a grouping of tools; and later another "tool" grouping is required. The examiner should not yield to the temptation to forego the later item, but should always administer it to determine how flexible is the concept formation of the subject—whether he considers this an encouragement to form a different grouping, or whether he regards the repetition suspiciously and looks for a "catch", or whether he reacts to it with the idea that his former group was incorrect, and so on. The responses to this repetition frequently give indications of the stability, flexibility, or insecurity of the subject's attitude toward his own thinking and reasoning. However, if the subject forms such a group on Part I and defines it on an abstract-conceptual level, the examiner may forego the administration of that item on Part II and score it as on Part I. But if the first grouping was either narrow or loose, or if the definition was not on an abstract-conceptual level, the corresponding item on Part II should be administered. The subject's reaction to the recurrence with modifications of a grouping he has already made is frequently significant of his thinking; it gives clues especially as to whether his concept formation is flexible enough to allow him to appreciate his mistakes and the examiner's correctness, or so rigid that he will criticize the group put before him by the examiner which does not comply with his own concepts.

D. ITEM ANALYSIS

In this section we shall (1) describe the items of the Sorting Test, giving the adequate groupings and adequate verbalizations for each; (2) present responses representative of the different levels of conceptualization for each item, and indicate their relative frequency; (3) present a brief statistical item analysis based on the responses of the Patrol, to differentiate the easy from the more difficult items. Our aim is to acquaint the reader with what may be expected of and how much diagnostic weight is to be put on failures on different items.

1. Part I of the Sorting Test.

Item 1. This item varies from subject to subject, since they choose the sample object.

Item 2. The sample here is the *large fork*. The adequate sorting includes the large knife and spoon, and the miniature fork, knife and spoon. The most frequent deviations from this grouping are either to exclude the miniature silverware, which is a mild narrowing; or to include the sugar cubes, which is a mild loosening. It is also acceptable to group all the metal objects with the fork under the definition "metal", though an inkling of loosening is here implied.

The definition on the abstract-conceptual level is "silverware" or "eating utensils"; on the functional level, "you eat with them" or "used for eating"; and on the concrete level, "you find them on the table" or "in the kitchen". The definition "a table setting" should be inquired into, because it may be either a concretistic definition or a misleading formulation of an abstract-conceptual definition.

Item 3. The sample here is the *pipe*. The adequate sorting includes the real cigar and cigarette, the imitation cigar and cigarette, and the matchbook. Omission of the two imitations, or the inclusion of only the matchbook, are both frequent. Loose groupings on this item are extremely rare, and should be considered a sign of pathology. The definition on the abstract-conceptual level is "smoking equipment" or "smoking utensils"; on the functional level, "you smoke them" or "used in smoking"; on the concrete level—usually when only the matches are added to the pipe—"you use the matches to light the pipe". The response "smoking set" should be inquired into, to determine whether it is a concrete or an abstract-conceptual definition.

Item 4. The sample here is the *bicycle bell*. The adequate sorting includes the round objects, or the metal objects, or the toys. All of these are rare even in our normal cases, and most frequently the lock and/or one or more tools are put with the bell. This item is the one most frequently failed. The abstract-conceptual definition is "round", "metal", or "toys";

the functional definition—when the lock is included—"used on a bicycle"; the concretistic definition—usually when the tools are included—"with them you put the bell on the bicycle", or "tools and the bell belong with a bicycle". Frequently the subject, especially when on a good conceptual level, is unable to find anything to group satisfactorily with the bell. Failures on this item, either through achieving no sorting or achieving a concretistic sorting, should not be looked at askance; and only loose sortings with far-fetched definitions are diagnostically significant.

Item 5. The sample here is the *red paper circle.* The adequate sortings include all the "red" objects, or all the "round" objects, or all the "paper" objects. The most frequent is the "paper" grouping, including filing card, green cardboard rectangle, matchbook, and real cigarette. No significance should be attached to the frequent omission of the cigarette. Abstract-conceptual definitions of these adequate sortings are "paper", "round", "red"; adequate functional definitions do not occur on this item; concretistic definitions are frequently given when the eraser is included, such as "if you write on the paper, you might need an eraser". Of all the items of Part I, syncretistic and fabulated responses are perhaps most frequently given on this; hence this item should be watched carefully. The usual syncretistic response is to put various objects with the circle, and define them as "all geometric shapes". In the fabulated responses, the circle is usually given the significance of a table-mat and the miniature silverware and sugar are grouped with it.

Item 6. The sample here is the *toy pliers.* The adequate sorting includes four miniature tools and two large tools. However, frequent sortings are (a) only the miniature tools; (b) all tools, the nails, and the block with the nail in it; (c) all toys, including miniature tools and tableware, ball, and imitation cigar and cigarette. These variations have no special diagnostic significance. The abstract-conceptual definition is "tools" or "toys"; the functional definition is "you use them to make something" or "fix something", or "used in carpenter work"; the concretistic definition is "found in a tool chest". On the concrete level the grouping may become very narrow, as when only the large pliers is added to the sample and the definition is "pliers", or when only the block with the nail in it is added and the definition is "you use the pliers to pull the nail out of the wood".

Item 7. The sample here is the *red rubber ball.* The adequate sortings are "rubber" objects (eraser, sink stopper, rubber cigar and rubber cigarette), "round" objects (two corks, bell, the paper circle), "red" objects, or "toys". The most frequent is the "rubber" grouping. The omission of the imitation cigar and cigarette is a relatively innocuous "temporary inefficiency"; but the inclusion of corks, with a modification of the concept to "rubbery" or "spongy", represents loosening of the concept basis. The adequate abstract-conceptual definition is "rubber", "round", "red", or "toys"; functional definitions occur mostly in the case of the toys, such as "to play with"; and similarly with concretistic definitions, such as "you find them in a child's playroom", or "child's". In some disorganized cases nothing is grouped with the ball, and the subject's verbalizations are pathologically concrete, such as "there is no bat to hit it with", or "no glove to catch it with". Such concrete attitudes in these disorganized people will on occasion lead to fabulated responses, such as putting the paper circle with the ball and defining it as "a sidewalk to bounce the ball on", or defining the cardboard square as "a baseball diamond".

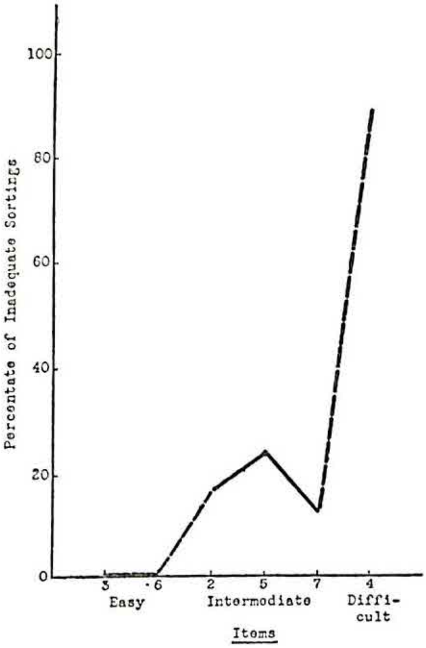


FIG. 33-A.—SORTING TEST: ITEM ANALYSIS OF PART I
Percentage of Inadequate Responses in the Control Group

Turning to our statistical item analysis of the achievements of the Patrol, represented in Figure 33-A, we find that Item 3 (pipe) and Item 6 (pliers) are the two easiest items on Part I, as both show no completely inadequate sortings. Item 2 (fork), Item 5 (red paper circle), and Item 7 (ball) are the three items of intermediate difficulty; 17%, 24%, and 13% of the Patrol have inadequate sortings on these, respectively. It should be noted that not more than one-fourth of the Patrol fails any of these three items. But 89% of them fail Item 4 (bell), thus indicating it to be so difficult that no diagnostic weight should be attached to failure on it.

Consequently, an inadequate grouping on Items 3 or 6 is indicative of maladjustment beyond the normal range; failures on Items 2, 5, and 7 are of dubious significance, although in our experience a massing of misses is generally indicative of severe maladjustment; and failures on Item 4 can be disregarded, unless they are far-fetched or bizarre in character.

2. Part II of the Sorting Test.

Item 1. The examiner sorts the ball, the paper circle, the matchbook, the sink stopper, and the eraser. The abstract-conceptual definition is "all red". The examiner does not include any objects which are only partly red, such as the tools. Functional and concretistic definitions are inadequate for this sorting, and the failures are usually one of the following: (a) *no response*; (b) a *split-narrow* response, where the group is split into two parts separately defined, such as rubber and paper subgroups; (c) *false* definitions, such as "for a child to play with"; and (d) *syncretistic* definitions, such as "all manufactured" or "all come from plants". This is one of the more difficult items of Part II, probably due in large part to its being the first item. That is, later items are more easily and more frequently passed than earlier ones of comparable difficulty, because of "learning".

Item 2. The examiner sorts the large silverware, the small silverware, the bell, the lock, the two nails, and the two pairs of pliers. The examiner does not include objects which are only partly metal. The abstract-conceptual definition is "all metal". Definitions such as "all steel" or "all iron" are also considered abstract-conceptual, though with some concretistic tinge, since only a specific kind of metal comes to mind. There is no adequate functional definition for this sorting; subjects who attempt such usually give syncretistic definitions, such as "all used by man", or "all used in our everyday life". There is no satisfactory concrete definition. The failures are usually *split-narrow*, as when the subject separates the silverware and the toys, or *syncretistic*, as exemplified above.

This was an easy item for the Patrol, and set many of them on the right track as to what was expected of them. In cases of serious disorganization of thinking, such as that present in Schizophrenics, this item lends itself to *fabulation:* "With these you eat your breakfast, and then you go to work with these, and this is a lock for your tool-chest, and this is a warning bell". Fabulation in this case appears to be an attempt to deal with an originally split-narrow reaction based on a concrete attitude to the objects, by uniting the split-narrow subgroups in a story.

Item 3. The examiner sorts the ball, sink stopper, two corks, bicycle bell, and paper circle. The abstract-conceptual response is "all round". Functional and concretistic definitions are unusual on these responses, and failures are usually of the following types: *split-narrow*, as when the rubber objects of the group are distinguished from the non-rubber objects, or the red objects from the non-red objects; *false*, as in the definition that "a child plays with them all"; *syncretistic*, as in "all found in a house", or "all used by man"; *fabulated*, as when the subject relates them all specifically in the everyday activities of a person; and finally, *no response*. This is one of the hardest items on Part II.

Item 4. The examiner sorts the large screwdriver and pliers, small screwdriver and pliers, small hammer and small hatchet. The abstract-conceptual definition is "all tools". A functional definition is "you use them to make things"; a concretistic definition is "all in the tool-kit". This is one of the easiest items on Part II and definitions deviating from abstract, functional or concrete levels are rare. Sometimes one gets *split-narrow* definitions within a conceptual definition, such as "all tools, but these are real tools and these are imitation tools". Where thinking is already disorganized, this split-narrow reaction may develop into a *fabulation:* "These are for the father in his work, and these are for his child who is imitating him".

Item 5. The examiner sorts the red paper circle, green cardboard square, white filing card, matchbook, and real cigarette. The abstract-conceptual definition is "all paper". A functional definition of this group is all but impossible, the nearest being "all used to write on"; but this is actually a *false* definition. Even concretistic definitions, such as "you find them all on a desk", contain an element of falseness. *Split-narrow* responses sometimes occur when the subject is doubtful about the cigarette because it contains tobacco, but this is rare enough that its occurrence indicates an over-meticulous mode of thinking. This item also lends itself to *fabulation:* "a man working at a desk (the filing card), smoking (the matchbook and cigarette)", and so on. *Syncretistic* definitions, such as "all come from plants", also occur.

Item 6. The examiner sorts all the items of which there are two, whether real or imitation; that is, the forks, knives, spoons, corks, nails, sugar cubes, screwdrivers, pliers, cigars, cigarettes. The abstract-conceptual response is "all pairs". In administering this item, each pair should be put closely together and separated from other pairs on the table; and both items of a pair should be put out in sequence. Contrary to expectation, this does not give away the answer; and Item 6 is actually one of the difficult items of Part II. The subject clinging to a functional level will actually give a *syncretistic* definition, "We use them all". Even concretistic responses are actually syncretistic on this item, such as "You find them all in the house." The great variety of objects prevents the subject from finding any more specific function or location for these objects, either of which would make it a functional or concretistic definition. *Fabulations*, especially about a father and son or even a whole family, are frequent on this item, because it presents such great difficulty and so many different objects. A frequent response is "a real and imitation (or miniature) of each"; this response has an element of abstract-conceptual thinking, since "two of each" is implicit in it. However, such a definition is partly *false*, because of the inclusion of the two identical sugar cubes, two identical nails, and two identical corks; and partly it has an element of the *split-narrow* meticulousness in it, because the subject will not accept the real and the imitation as both possibly representing a "pair".

Item 7. The examiner sorts the real cigarette, the two sugar cubes, the filing card, and the green rectangle turned on its reverse (white) side. The abstract-conceptual definition is "all white". As on previous items, attempts at functional or concretistic definitions usually prove essentially *syncretistic* or *fabulatory*. Meticulousness also is seen when the subject has difficulty because of the brown tobacco in the cigarette, and gives a partly *split-narrow* definition. This too is one of the difficult items on Part II, as was the "red" first item.

Item 8. The examiner sorts the sink stopper, imitation cigar, imitation cigarette, ball, and eraser. The abstract-conceptual definition is "all rubber." This item and the ninth are apparently the easiest on Part II, as not one case of our 54 Normals failed either. Functional and concretistic definitions are also well-nigh impossible, and poor responses are usually *syncretistic*, *fabulatory*, or *split-narrow*.

Item 9. The examiner sorts the pipe, real cigar and cigarette, imitation cigar and cigarette, and matchbook. The abstract-conceptual response is "all smoking material (or equipment)". This item and the eighth are the easiest on Part II. Functional definitions are usually "You use them to smoke with", or "You smoke them"; a concretistic definition is "You find them on a smoking stand". *Split-narrow* responses occur when the subject cannot integrate the two imitations with the real objects. Responses to this item are generally on either the abstract-conceptual, functional, or concretistic levels; and any other type of response on this easy item is usually indicative of profound pathology.

Item 10. The examiner sorts the large silverware, and the miniature silverware. The abstract-conceptual definition is "all silverware", or "all eating utensils". Functional definitions are "You eat with them", or "used in eating"; a concretistic definition is "found on the table". This also is one of the easy items. Any definition departing from these three levels is indicative of disorganized concept formation. *Split-narrow* responses do occur, as the subject may not be able to reconcile the real and imitation utensils; in schizophrenics especially, this split-narrow perception may lead to *fabulatory* or *symbolic* connections in terms of "parent's" and "child's".

Item 11. The examiner sorts the four miniature tools, three miniature eating utensils, imitation cigar, imitation cigarette, and ball. The abstract-conceptual definition is "toys", or "playthings". A functional definition is "You play with them all"; concretistic definitions are "for a child", or "you find them in a child's room". This is an item of intermediate difficulty, and any definition departing from these three levels usually becomes a diagnostic indicator.

Item 12. The examiner sorts the filing card, green cardboard rectangle, block of wood with the nail in it, matchbook, and two sugar cubes. The abstract-conceptual definition is "all rectangles". Attempts at functional or concretistic definitions usually turn out as *syncretistic*, or *fabulatory*, or simply *false*. This is one of the most difficult items on the test. Definitions such as "all have right angles", or "all squares", are not quite as accurate as "all rectangles", but are acceptable as abstract-conceptual.

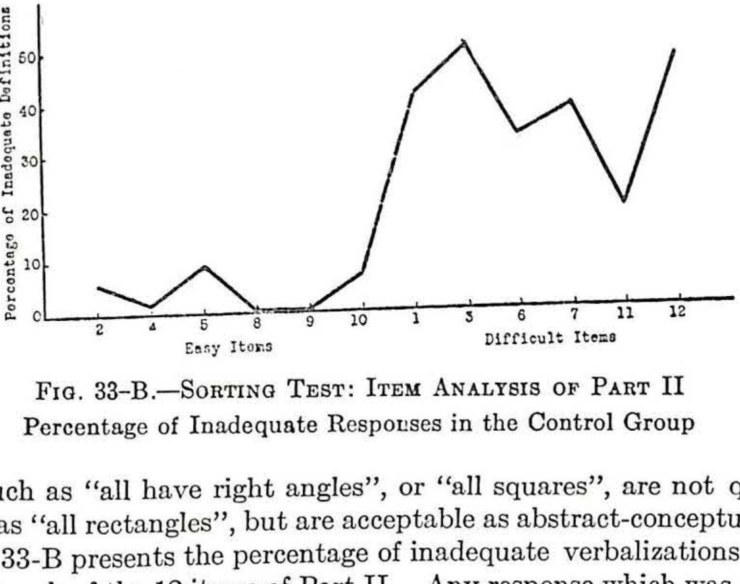


FIG. 33-B.—SORTING TEST: ITEM ANALYSIS OF PART II
Percentage of Inadequate Responses in the Control Group

Figure 33-B presents the percentage of inadequate verbalizations in the Patrol on each of the 12 items of Part II. Any response which was neither an adequate abstract-conceptual nor functional definition was considered for this purpose a failure. We see in Figure 33-B that on Items 2, 4, 5, 8, 9, and 10, not more than about 9% of the Patrol fails; and on Items 8 and 9 it has no failures. However, on Items 1, 3, 6, 7, 11, and 12, from 20% to 50% of the Patrol fails. Thus the two levels of difficulty on Part II are sharply distinguished, though within each level there is variation of difficulty. The examiner should therefore keep in mind that failures on the easy items of Part II should be considered as indicative of impairment or disorganization of concept formation; this is especially the case if failures on the easy items are massed. Of course, any failure which contains a fabulatory or otherwise bizarre element, regardless of the item's difficulty, is also an indicator of pathology. In this discussion of the items and the types of responses to them, we have indicated only briefly the variety of sortings and definitions possible. In the course of testing many hundreds of patients, the examiner comes across many unique definitions or sortings; and the scoring and interpretation of the response must be left to his judgment. One sometimes finds unusual but nevertheless correct sortings; but very unusual definitions, especially on Part II, are rarely adequate. Such responses, in our experience, have been rendered scorable and understandable in terms of the rationale of the test we advanced.

E. STATISTICAL RESULTS

In this section we shall discuss our statistical results as follows: (1) the differentiation of the clinical groups in terms of their adequacy of sorting on Part I, and their adequacy of verbalization on Part II, of the test; (2) the differentiation of the clinical groups in terms of the width of their concept span on Part I; (3) the differentiation of the clinical groups in terms of the conceptual levels and types of the definition given by them for their own sortings, and for the examiner's sortings.

In these analyses we did not always use the same subgroups of our major clinical groups for purposes of statistical comparison; rather we grouped together those subgroups of a major group which followed the same trend in regard to the score in question, and in which this trend was at least partly understandable on the basis of our clinical understanding of the groups.

It is important to point out that the following analyses show that some of the diagnostic indicators we used do not necessarily increase in frequency with increasing profundity of maladjustment or deterioration. Some of these diagnostic indicators show their greatest predominance in the less malign forms of the maladjustment of which they are characteristic. We shall put special emphasis on these findings, inasmuch as in clinical practice they are good indicators of impending severe maladjustment; thus in special circumstances, such as the present war emergency, they may be used to weed out persons likely to break down under stress.

In these discussions we shall repeatedly have recourse to the results of the genetic study of concept formation previously mentioned, in order to show how far the various clinical and control groups deviate from the "norms" set by the findings therein, concerning the development of concept formation from childhood to adolescence.

1. *Adequacy of Sorting* (*Part I*) *and of Verbalization* (*Part II*).

(a) The Results of the Developmental Study.

Table 80 presents the data from the genetic study of ages 4–14; it contains the combined percentage of adequate (plus) and nearly adequate (plus/minus) sortings on Part I, and verbalizations on Part II. The adequacy scores for active sorting show a steady though irregular increase up to the age of 9, where the peak is reached; on the other hand, the adequacy of verbalization which also shows a progressive increase with age, reaches its peak only at 14 years. Except for the 14-year level, the adequacy of definitions is always inferior to that of active sorting. In other words, active concept formation seems to become adequate earlier than understanding concept formation, or compliant conceptual thinking. However, socially-compliant conceptual thinking at 14 years surpasses in adequacy that of active concept formation.

We conclude that, as intellectual maturation progresses, a compliance with socially-accepted norms of thinking becomes progressively greater and more adequate; while active concept formation, though it develops earlier, remains more autonomous, uncompliant, and less adequate.

TABLE 80.—*Development of Adequacy: Ages 4–14*

Age	% of Adequacy on Part I	% of Adequacy on Part II
4	29	12
5	73	30
6	63	34
7	67	48
8	73	63
9	81	56
10	81	58
11	81	67
12	83	67
13	84	69
14	79	86

(b) The Adequacy of Sorting and Verbalization. Table 81 presents for both parts of the test the percentage of responses in each of our groups falling into each of the four adequacy—inadequacy categories.

We find that in almost all of our clinical and control groups the relationship between adequacy on Part I and on Part II is similar to that found in the developmental study. This superiority on Part II is perhaps most pronounced in our three control groups, although the Preschizophrenics show a similar pattern. Thus it appears that the findings on the 14-year level in the genetic study represent a relationship which continues in later life. This conclusion is warranted also by the fact that the population of the genetic study (Kansas school children) is similar in background to the Patrol. It is possible that in individuals with a richer environmental background and endowment, such as constitute our clinical groups, active concept formation would be less inferior in adequacy to compliant concept formation. That this is not clearer for our clinical groups than is seen in Table 82 is largely due to the fact that active concept formation is more vulnerable to impairment by maladjustment than is compliant concept formation. This relationship is reversed only in some of the most malignant disorders, where even compliant concept formation is encroached upon: namely, in some of the Schizophrenic groups, in the Depressive Psychotics, and in the Neurasthenics.

TABLE 81.—*Adequacy in the Clinical and Control Groups*

Group	No. of Cases	Percentage of Adequacy on Part I				Percentage of Adequacy on Part II			
		+	±	∓	−	+	±	∓	−
U Sch A	8	59	14	5	23	65	6	2	27
U Sch Ch	10	43	13	9	36	61	6	4	29
U Sch D	4	33	18	—	50	19	8	4	69
P Sch A	8	64	13	4	20	45	16	—	40
P Sch Ch	8	49	14	1	36	57	8	3	33
P Sch D	3	47	19	4	29	50	23	3	25
P Co	13	64	11	3	21	68	6	1	26
S S	7	51	16	—	33	62	11	3	25
Pr C	11	59	11	7	23	68	9	—	23
Pr O-I	12	50	14	10	26	72	5	2	22
DP + DI	7	67	6	—	27	48	8	1	43
DSN + DN	13	50	13	4	33	58	6	—	38
Hy	15	67	16	4	13	76	3	—	22
A & D	8	59	11	7	23	67	3	1	30
MN	6	57	7	3	33	63	13	2	23
O-C	12	67	17	3	14	70	9	2	19
Neuras	5	66	6	3	26	42	13	—	45
P (1)	32	64	11	4	20	74	7	1	18
P (2)	17	60	16	3	21	70	5	1	24
P (3)	5	49	20	11	20	68	5	—	27
Special Groups:									
(P + U + S) Sch	48	51	13	4	31	54	8	3	33
Depr	20	56	11	3	31	54	7	−8	39
Pr (C + O-I)	23	54	13	9	24	70	7	1	23
Neurotics	46	64	13	4	19	68	7	1	23
Patrol	54	61	14	4	20	73	6	1	21

These trends become even clearer in Figure 34, which represents for Part I and Part II the percentage of responses in each group obtaining adequacy scores of "plus". It is interesting to note here that, among the Unclassified and Paranoid Schizophrenics, the Chronic groups give a markedly more adequate performance on Part II than on Part I. We have mentioned before, especially in the section on the Bellevue Scale, that many Chronic Schizophrenics have a "good front"—which in effect means an ability to comply with social norms—behind which there lies a considerable disorganization of thinking. Thus, if presence of Schizophrenia has been indicated by other tests, and if compliant concept formation is markedly superior to active concept formation—as measured by the Sorting Test—the likelihood is that we are dealing with a psychosis settling into an "ambulatory" chronic condition.

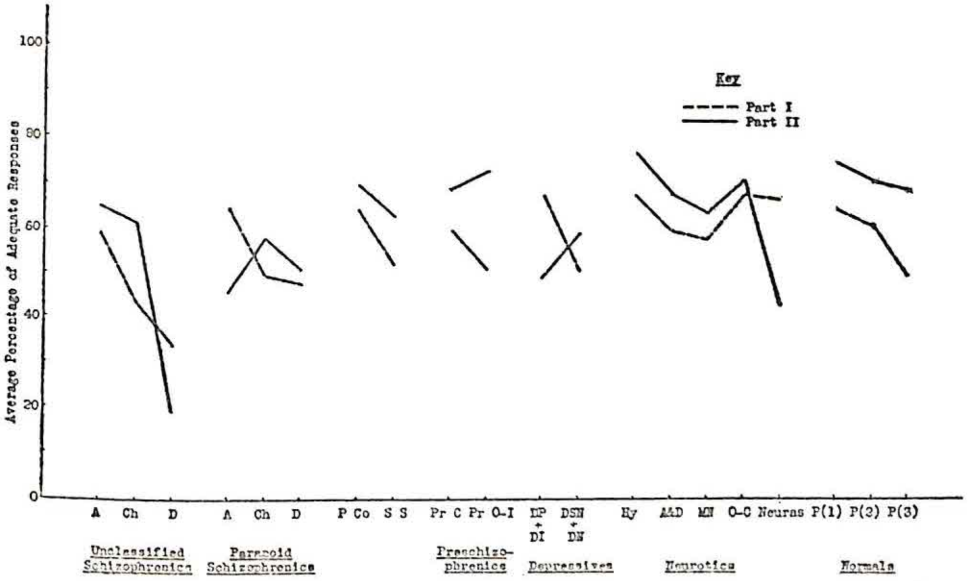


FIG. 34.—SORTING TEST: PERCENTAGE OF ADEQUATE RESPONSES ON PART I AND PART II
Group Averages

It is also striking to note in Figure 34 that, in the Patrol breakdown into Well-Adjusted, Borderline-Adjusted and Maladjusted subgroups, adequacy shows a progressive decrease with increasing maladjustment. We found similar results on some of the Verbal subtests of the Bellevue Scale, where increasing maladjustment in "Normals" of a poor cultural background appeared to affect significantly their efficiency. This finding again emphasizes the need to take cultural background into account when evaluating a subject's test achievements. Thus it is not surprising that the Patrol averages only about 4 out of 7 adequate active sortings; while our Neurotics, with their richer cultural background, and in spite of their maladjustment, show a slightly superior adequacy of active sortings. Consequently, the adequacy of active sorting on Part I is subject to influences other than maladjustment to such a degree that by itself, without regard for cultural background, it cannot be used for diagnostic differentiation. However, if we turn to Part II on Figure 34, which presents the "plus" percentages for the major clinical groups, we see that the adequacy of complaint concept formation on Part II is diagnostic, since here the Schizophrenics and Depressives are far more inadequate than the other groups.

Let us turn from the discussion of adequacy to that of inadequacy of concept formation—as represented by the "minus" score—for both active sorting and compliant definition. Figure 35 presents the percentage of responses of each group, on both parts of the test, which were scored "minus". The most inadequate groups on Part I are the Simple, Chronic and Deteriorated Schizophrenics, the Depressives, and—surprisingly—the Mixed Neurotics. Thus, with the exception of the latter, it appears that extreme inadequacy of active sorting is present in the most profoundly impaired clinical groups, and particularly in the long-standing Schizophrenias.

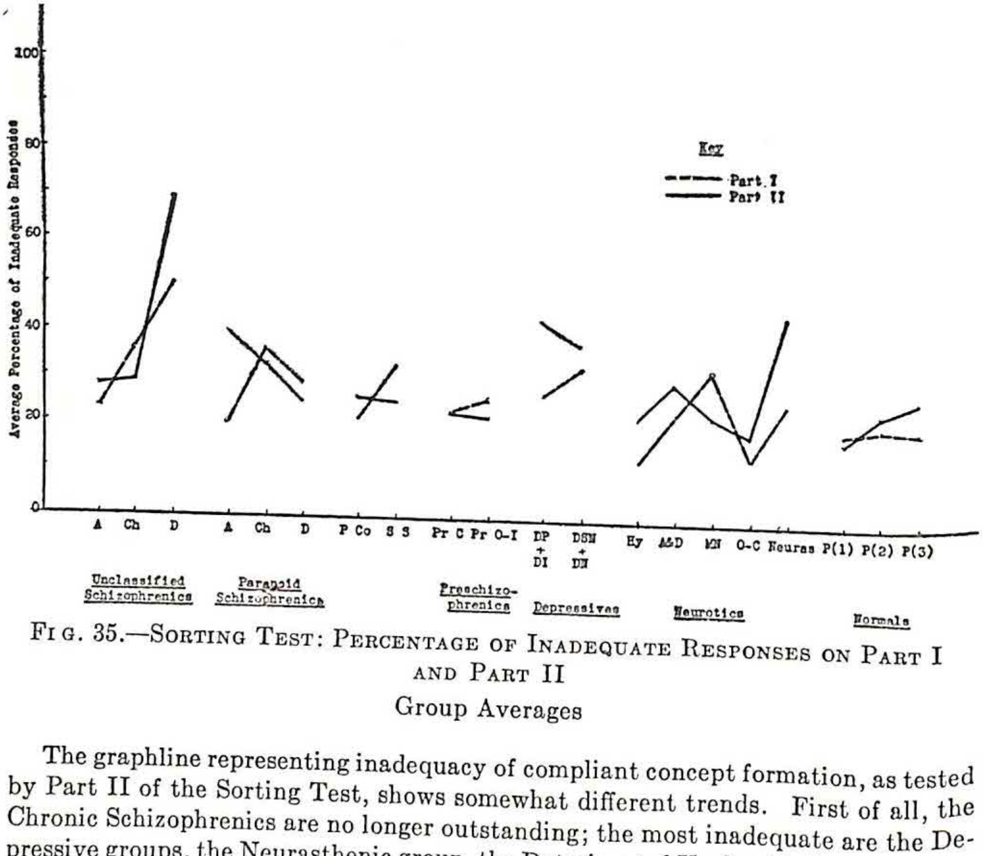


FIG. 35.—SORTING TEST: PERCENTAGE OF INADEQUATE RESPONSES ON PART I AND PART II

Group Averages

The graphline representing inadequacy of compliant concept formation, as tested by Part II of the Sorting Test, shows somewhat different trends. First of all, the Chronic Schizophrenics are no longer outstanding; the most inadequate are the Depressive groups, the Neurasthenic group, the Deteriorated Unclassified Schizophrenics, and the Acute Paranoid Schizophrenics. It is interesting to note that, among the Neurotic groups, the Neurasthenics show an inadequacy equal to that of the Depressive Psychoses; and that the next most inadequate Neurotic group is the Anxiety and Depression group, which also follows here the depressive pattern. It is noteworthy that the percentage of inadequate definitions in the Patrol increases with maladjustment. The distribution of the Acute and Chronic Unclassified Schizophrenics is quite close to that of the Maladjusted Patrol, but this closeness is the consequence of different factors: in the Patrol, it is a result of the impact of maladjustment tendencies upon an originally meagre development of concept formation; in the Acute and Chronic Schizophrenics, it is a result of the impact of a psychosis upon an originally good cultural background and a well-developed concept formation. The Deteriorated Paranoids have a quite low percentage of "minus" scores. The group is very small and consequently the percentage cannot be considered reliable: nevertheless, as we pointed out in the section on nosology, the Deteriorated Paranoid Schizophrenics show a retention of compliant behavior and of interest in appearance; and apparently this compliant thinking directed toward the outer world, in spite of their deterioration, is reflected in their fair adequacy of compliant concept formation. It is interesting to note the reversal of trends between the Unclassified and Paranoid Schizophrenias; the latter is improved, while the former is impaired, in compliant concept formation, with the progression of the schizophrenic process.

We conclude that (1) in clinical groups also the adequacy of compliant concept formation is greater than that of active concept formation. (2) Where the adequacy of compliant concept formation is poorer than an impaired adequacy of active concept formation, a malignant disorder—Schizophrenia, Depressive Psychosis, or Neurasthenia—is indicated. (3) *Extreme* inadequacy of active concept formation is a sign of profound maladjustment, usually of long-standing Schizophrenia. (4) In Chronic Schizophrenics, the adequacy of compliant concept formation tends to be fairly well retained. (5) Paranoid Schizophrenics improve, while Unclassified ones are impaired, in compliant concept formation with the progression of the schizophrenic process from acuteness to deterioration. (6) Among the Neurotics, the depressive-like groups—Neurasthenic, and Anxiety and Depression—show the greatest impairment of compliant concept formation. (7) A poor cultural background in a normal may frequently result in a limited adequacy of active concept formation, especially if some trends toward maladjustment are present. This cultural factor little affects compliant concept formation.

(c) Adequacy Scores: "*t*"-Test.

Table 82 presents in its first part the *t*-test of the significance of the differences between the mean number of inadequate sortings in the different clinical groups on Part I. Its outstanding features are that the Obsessive-Compulsives and Hysterics, taken together, have a significantly lower average number of inadequate sortings (1.0) than the Patrol (1.4); and that the Patrol cannot be statistically differentiated from the most inefficient of the Neurotic groups—the Anxiety and Depression group, and the Neurasthenics. Otherwise the Patrol is significantly better than all the Schizophrenic groups—excepting the Acute cases—and the Depressive Neuroses, and shows a trend to be better than the Depressive Psychoses. The combined Obsessive-Compulsive and Hysteric groups are the most adequate of all the groups on Part I and are significantly better than the depressive-like Neurotics, the Depressives, and the Chronic, Deteriorated and Simple Schizophrenics. Only from the Acute Schizophrenics is their differentiation not sharp. The Chronic Schizophrenics show a trend to be worse than the Acute Schizophrenics in the adequacy of active sorting.

The second part of Table 82 presents the *t*-test of the significance of the differences between the mean number of inadequate verbalizations in the different groups on

Part II. Here the Patrol is as good as, or better than, any other group; thus it sets a standard for adequacy of compliant concept formation. The Patrol is significantly or nearly significantly better than all the Schizophrenic groups, is significantly better than the Depressives and Neurasthenics, and shows a trend to be better than the Anxiety and Depression group. The combined Obsessive-Compulsive–Hysteric–Mixed Neurotic group, with the same averages as the Patrol, shows in general a similar differentiation from the other groups. The total combined Depressives are rather well-differentiated from the Unclassified Schizophrenics and the Preschizophrenics; these have a lower average of inadequate verbalization than the Depressives, excepting the Deteriorated Unclassified Schizophrenics, who have a much higher average. The Acute and Chronic Unclassified Schizophrenics are of course significantly better than the Deteriorated Unclassified Schizophrenics, who have an inadequacy of verbalization far in excess of any other clinical group, in average 8.3.

TABLE 82-A.—*Average Inadequacy on Part I and Significance of Differences*

Group	Av.	Group	Av.	"t"	Significance
Patrol	1.4	U Sch Ch	2.5	3.26	<1%
		U Sch D	3.5	4.58	<1%
		P Sch (Ch + D)	2.4	2.87	<1%
		SS	2.3	2.85	<1%
		DP + DI	1.9	1.60	10–20%
		DSN + DN	2.3	3.39	<1%
		O-C + Hy	1.0	2.06	2–5%
		A & D + Neuras	1.7	.75	40–50%
		MN	2.3	2.64	<1%
O-C + Hy	1.0	(U + P) Sch A	1.5	1.22	20–30%
		DP + DI	1.9	2.46	1–2%
		DSN + DN	2.3	3.97	<1%
		A & D + Neuras	1.7	1.98	2–5%
		MN	2.3	3.25	<1%
(P + U) Sch Ch	2.5	(P + U) Sch A	1.5	1.60	10–20%
Patrol Anx	1.3	Patrol Non Anx	1.7	1.81	5–10%

The Preschizophrenics are significantly better than the Acute and Chronic Paranoid Schizophrenics. This last finding is important for purposes of differential diagnosis: on the Bellevue and Babcock Test it was not always possible to differentiate the scatter pattern of Preschizophrenics from that of the Acute Paranoid Schizophrenics. An analysis of the Patrol in terms of the Anxious and Non-Anxious cases (Table 82) shows the effect of anxiety upon adequacy of active grouping and of compliant concept formation. As regards active sorting, anxiety does not appear to have any significant effect; on the contrary, the Anxious group shows a strong trend to be even more adequate than the Non-Anxious group. As regards compliant concept formation, it appears that anxiety does impair adequacy of "understanding"; and this impairment becomes even sharper if we consider only the most anxious of the Patrol cases (Anxiety-rating 2), who show a significantly greater inadequacy of definition than the Non-Anxious Patrol. We interpret these findings to mean that the presence of anxiety in a "normal" subject, when faced with a task *to be done on his own*, causes him to exert himself in order to perform adequately, and thus actually helps achieve this goal; on the other hand, when faced with a task involving passive "understanding", the normal subject's efficiency is disrupted by the anxiety, and his grasp on the material and the problem may suffer.[6]

We conclude that (1) Schizophrenic chronicity and deterioration and depression are most potent in causing inadequacy of active sorting. (2) A superior cultural background, in spite of the impact of neurosis, may result in the retention of an adequacy of active sorting superior to that found in normals of poor cultural background. (3) Schizophrenic deterioration, depression, and neurasthenia make for the greatest inadequacy of compliant concept formation. (4) Even non-deteriorated schizophrenics are

TABLE 82-B.—*Average Inadequacy on Part II and Significance of Differences*

Group	Av.	Group	Av.	"t"	Significance
Patrol	2.5	U Sch (A + Ch)	3.4	1.79	5–10%
		U Sch D	8.3	6.08	<1%
		P Sch A	4.8	3.02	<1%
		P Sch Ch	4.0	1.90	5–10%
		DP + DI	5.1	3.53	<1%
		DSN + DN	4.5	3.04	<1%
		A & D	3.6	1.59	10–20%
		Neuras	5.4	3.43	<1%
O-C + Hy + MN	2.5	P Sch (A + Ch)	4.4	2.61	<1%
		Depr	4.7	3.45	<1%
		A & D	3.6	1.45	10–20%
		Neuras	5.4	3.24	<1%
Depr	4.7	U Sch (A + Ch)	3.4	1.66	5–10%
		U Sch D	8.3	2.44	2–5%
		P Co	3.1	1.77	5–10%
		Pr (C + O-I)	2.7	2.74	<1%
		A & D	3.6	1.02	30–40%
U Sch (A + Ch)	3.4	U Sch D	8.3	4.46	<1%
P Sch (A + Ch)	4.4	Pr (C + O-I)	2.7	2.03	2–5%
Patrol Anx	2.8	Patrol Non Anx	1.9	1.75	5–10%
Patrol Anx$_2$	3.1	Patrol Non Anx	1.9	2.00	2–5%

---

[6] Paralleling this finding, we noted that the Anxious Patrol tended to perform more efficiently than the Non-Anxious Patrol on most of the Performance subtests of the Bellevue Scale.

impaired in adequacy of compliant concept formation. (5) The most adequate compliant concept formation occurs in normals and non-depressive neurotics. (6) Within the normal range, anxiety, although of aid in active grouping, disrupts the efficiency of compliant concept formation.

(d) Adequacy Scores: Chi^2 Test.

In Table 83 a distribution of cases based on their number of inadequate sortings is presented for both parts of the test, together with the differential significance of these distributions. Thus, as regards inadequate groupings on Part I, we see the combined Schizophrenics and the combined Depressives to be significantly worse than the combined Neurotics and the combined Patrol; there is no sharp differentiation between the Depressives and Schizophrenics, although the Depressives do have a much greater massing of cases with 2 or more inadequate sortings. As regards adequacy of definition on Part II, the Schizophrenics and the Depressives are significantly worse than either the three non-depressive Neurotic groups or the Patrol. The depressive-like Neurotic groups—Anxiety and Depression, and Neurasthenia—show a considerable massing of cases in the intermediate range of inadequacy, and thus are significantly inferior to the other Neurotics or the Patrol.

TABLE 83-A.—*Percentage of Cases in Ranges of Adequacy on Part I*

Group	No. of Cases	Percentage of Cases with:		
		0–1 Inadequacies	2–3 Inadequacies	4–7 Inadequacies
(P + U) Sch	41	44	39	17
Depr	20	30	60	10
Neurotics	46	65	33	2
Patrol	54	67	33	—

TABLE 83-B.—*Differential Significance of Distribution of Cases*

Groups Compared	Chi^2 (d.f. = 2)	Significance
(P + U) Sch : Depr	2.45	30%
(P + U) Sch : Neurotics	7.15	2–5%
(P + U) Sch : Patrol	11.65	<1%
Depr : Neurotics	7.61	2–5%
Depr : Patrol	12.08	<1%

We conclude that Schizophrenia, Depression, and Neurosis with a strong depressive coloring, make for the greatest inadequacy of concept formation.

(e) Summary of Adequacy Scores. We conclude that the adequacy of sorting and definition can serve as a diagnostic indicator; that groups can be differentiated significantly on the basis of impairment of either active concept formation or compliant concept formation; that especially is impairment of the adequacy of compliant concept formation an indicator of maladjustment.

The adequacy of sorting and verbalization is, however, only one aspect of this test; in spite of the statistical findings, diagnosis cannot be safely based on this aspect alone. We shall turn now to other aspects of performance for further diagnostic indicators, to differentiate groups which have thus far remained undifferentiated from each other.

2. The Concept Span on Part I. We defined the concept span of active sorting as the extent to which the sorting of the subject approximates the correct one. We have stated that, where too few of the correct objects are sorted, the sorting is considered "narrow"; where more than, or other than, the appropriate objects are included, the sorting is considered "loose". Here we shall present the statistical analysis of our findings concerning concept span.

TABLE 83-C.—*Percentage of Cases in Ranges of Adequacy on Part II*

Group	No. of Cases	Percentage of Cases with:		
		0–3 Inadequacies	4–6 Inadequacies	7–12 Inadequacies
(P + U) Sch	41	49	27	24
Depr	20	40	25	35
A & D + Neuras	13	23	69	8
O-C + Hy + MN	33	70	27	3
Patrol	54	69	29	2

TABLE 83-D.—*Differential Significance of Distribution of Cases*

Groups Compared	Chi^2 (d.f. = 2)	Significance
(P + U) Sch : (O-C + Hy + MN)	6.95	2–5%
(P + U) Sch : Patrol	12.02	<1%
Depr : (O-C + Hy + MN)	10.44	<1%
Depr : Patrol	16.55	<<1%
(A & D + Neuras) : (O-C + Hy + MN)	8.06	2%
(A & D + Neuras) : Patrol	9.06	1%

(a) Loosening of the Concept Span.

(1) *The Developmental Study.* Before turning to the results of our research population, we shall consider the incidence of loose—"L"—and mildly loose—"(L)"—sorting in the age groups 4–14, as found in our genetic study.[7]

---

[7] In the developmental study we did not differentiate between the "(L)" and the "l" responses; hence these averages are not completely comparable with those on our clinical cases, and it can only be stated that the "(L)" scores are mainly of the "l" type in this study.

gression is irregular, there appears to be a decline in the incidence of the essential narrowing, though much less of the mild narrowing. Thus, as in loosening, extreme narrowing decreases with increasing maturity, while a fairly high incidence of mild narrowing persists.

We conclude that it is the pervasiveness of *essential* narrowing which represents deviation from the norm, and which should be considered pathological.

(2) *The Frequency of the "N"-Score.*

The graphline in Figure 37 presenting the percentage of cases with 2 or more "N" scores shows that the incidence is greatest among the Depressives (80%) and the depressive-like Neurotics, the Anxiety and Depression and Neurasthenic groups (77%). No other group approaches these; only about 33% of the Patrol and of the Schizophrenics have 2 or more "N" scores.

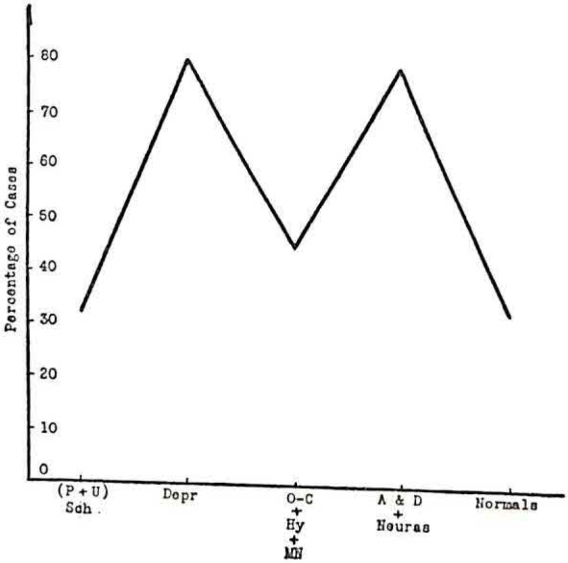


FIG. 37.—SORTING TEST: NARROW SORTINGS
Percentage of Cases with Two or More Narrow Sortings

Table 88 presents these distributions as modified to fall in three ranges: 0–1, 2–3, and more than 3 essential narrowings. Here these trends become somewhat more differentiated, but follow the same pattern of increased frequency in Depression.

(3) *"N"-Score: Chi^2 and "t"-Tests.*

In Table 88 the differential significance of these distributions of cases shows the Depressives to significantly exceed the Schizophrenics, the Patrol, and the non-depressive Neurotics; and even the depressive-like Neurotics show a strong tendency to exceed the other Neurotics.

Table 89 presents the *t*-tests of the significance of the differences between the groups; it shows the Patrol to have a significantly lower average than the Depressives or the depressive-like Neurotics, and a trend to be significantly below the Deteriorated Schizophrenics. This also holds true for the non-depressive Neurotics.

Although the Deteriorated Schizophrenics have a high incidence of the "N"-score, this does not indicate narrowing of the type found in the Depressive cases. In the latter a true narrowing occurs: the subject's conscientious efforts lead him to conclude that there is nothing which belongs with the sample. In the Deteriorated Schizophrenics it is rather uninterestedness, and/or inability to concentrate, which prevent them from even seeking other objects. Table 89 shows a strong trend in the Deteriorated Schizophrenics—who on the Bellevue Scale suffered the greatest impairment of attention and concentration—to have more essential narrowings than the Chronic Schizophrenics. On the other hand, when the Deteriorated Schizophrenics do respond they usually make all too inclusive groupings; whereby they are differentiated from the Depressive Psychotics.

TABLE 88-A.—*Percentage of Cases with Narrow Sortings*

Group	No. of Cases	Percentage of Cases with:		
		0–1	2–3	>3
(P + U) Sch	41	68	22	10
Depr	20	20	55	25
A & D + Neuras	13	23	54	23
O-C + Hy + MN	33	55	39	6
Patrol	54	67	26	7

TABLE 88-B.—*Differential Significance of Distributions*

Groups Compared	Chi² (d.f. = 2)	Significance
Depr : (P + U) Sch	12.36	<1%
Depr : (O-C + Hy + MN)	7.05	2–5%
Depr : Patrol	10.93	<1%
(A & D + Neuras) : (O-C + Hy + MN)	4.95	5–10%

Table 90 shows that, even within the Normal range, the Inhibited Patrol tends to have more essential narrowings of the concept span than the Non-Inhibited Patrol.

We conclude that (a) accumulation of essential narrowings of the concept span on Part I of the Sorting Test is indicative of the presence of depressive trends, which retard the ease and flexibility of the interaction of inductions and deductions necessary to form an adequate sorting. (b) Schizophrenic impairment of attention and concentration, with a consequent inability to make systematic and relevant inductions and deductions, may also result in the accumulation of essential narrowings. (c) Inhibition in normal subjects tends to narrow the concept span.

(4) "(*N*)"-*Score: "t"-Test.*

Table 89 presents, in its second part, the *t*-test of the significance of the difference between the incidences of mild narrowing in the different groups. Here the Obsessive-Compulsives stand out from the other Neurotic groups. In discussing the rationale of sorting, we pointed out that over-meticulous and doubt-ridden subjects generally omit one or several objects, minor features of which deviate from their rigid concepts. Such meticulousness is characteristic of the Obsessive-Compulsives, and they become differentiated from the other Neurotics on the basis of the "(N)"-

TABLE 89.—*Averages of Narrow and Mildly Narrow Sortings and Significance of Differences*

Group	M	Group	M	"t"	Significance
Narrow					
Patrol	1.3	(P + U) Sch D	2.3	1.82	5–10%
		Depr	2.7	3.69	<1%
		A & D	2.6	2.65	<1%
		Neuras	2.6	2.59	<1%
O-C + Hy + MN	1.4	(P + U) Sch D	2.3	1.55	10–20%
		Depr	2.7	3.07	<1%
		A & D + Neuras	2.6	2.84	<1%
(P + U) Sch (A + Ch)	1.2	(P + U) Sch D	2.3	1.94	5–10%
Mildly Narrow					
DP + DI	2.4	DSN + DN	1.4	1.90	5–10%
Pr C	2.6	Pr O-I	1.1	2.93	<1%
O-C	2.1	Neurotics − O-C	1.6	1.02	30–40%

TABLE 90.—*Averages of Narrow and Mildly Narrow Sortings in Patrol Subgroups and Significance of Differences*

Group	M	Group	M	"t"	Significance
Narrow					
Patrol Sch	.6	Patrol Non-Sch	1.4	1.98	2–5
Patrol Inhib	1.4	Patrol Non-Inhib	.9	1.36	10–20
Patrol Depr	.9	Patrol Non-Depr	1.3	1.06	20–30
Mildly Narrow					
Patrol Inhib	2.3	Patrol Non-Inhib	2.9	1.73	5–10
Patrol Anx	2.3	Patrol Non-Anx	2.9	1.72	5–10

score. Table 89 also indicates that the incidence of mild narrowing is significantly greater in the extremely inhibited Coarctated Preschizophrenics than in the Over-Ideational Preschizophrenics. The Depressive Psychotics, in addition to their essential narrowings, show a strong tendency to have more mild narrowings than the Depressive Neurotics.

We conclude that, despite considerable overlap in the frequency of mild narrowings in all the groups, compulsive meticulousness as found in the Obsessive-Compulsives, and extreme inhibition as found in the Coarctated Preschizophrenics or Inhibited Normals, may result in a greater incidence of mild narrowings.

(c) Concept Span Summary.

In this statistical analysis of the concept span, there has emerged a rather sharp differentiation between the concept formation patterns of the Depressives and of the Schizophrenics: the Schizophrenics tend to show essential loosening, and the Depressives tend to have essential narrowing, of the concept basis. Thus, in many cases, the Sorting Test becomes crucial in the differential diagnosis of Depression and Schizophrenia. Furthermore, we have found that even mild deviations in either direction may indicate the presence of these trends; and mild narrowing may indicate the presence of inhibition or over-meticulousness.

3. The Conceptual Level. In this section we shall discuss the different levels of conceptualization predominating in the different clinical and control groups, on both parts of the test. We shall consider not only the abstract-conceptual, functional, and concretistic, but also syncretistic, fabulatory, and split-narrow definitions, and the complete failures where no response at all is offered.

(a) The Developmental Study.

Table 91 presents the results of our developmental study concerning the percentage of abstract-conceptual and functional definitions on both parts of the test. It is apparent that, beginning with the 11-year level, abstract-conceptual definitions are much more prevalent on Part II than on Part I. The incidence of abstract-conceptual definitions (C.D.) shows a progressive increase with age, but at the highest age level—14 years—the percentage of sortings on an abstract-conceptual level on Part I is only 46%, while on Part II it is 72%. On the other hand, functional definitions are much more prevalent on Part I than on Part II at all age levels. That is, concept formation requiring compliance with social norms is generally on a much higher conceptual level than is active concept formation.

We conclude that the norm is a greater incidence of abstract-conceptual definitions on Part II, with few functional definitions; whereas on Part I, the functional definitions may be more, and the abstract-conceptual definitions less, frequent.

(b) The Frequency of Abstract-Conceptual Definitions.

In each of its parts, Table 92 presents in the first two columns the percentage of conceptual and of functional definitions in all our groups. In the three Patrol groups, we see that the percentage of abstract-conceptual definitions on both parts of the test is about the same as that achieved around the 14-year level by the subjects of our developmental study, who were of a similar cultural background. Thus the percentage at the 14-year level and that of the Patrol can be taken to indicate the peak of conceptual development in Normals with this background. In the Patrol, however, the percentage of functional definitions is somewhat lower on both parts of the test than it is on the 14-year level. The norm thus appears to be that in the average Normal subject at least half of the definitions on Part I, and about two-thirds of those on Part II, should be abstract-conceptual.

TABLE 91.—*Development of Conceptual Level: Ages 4–14*

Age	Part I		Part II	
	%CD	%FD	%CD	%FD
4	1	11	6	5
5	36	11	24	6
6	20	24	21	13
7	31	27	31	15
8	29	37	36	14
9	40	34	36	17
10	44	30	40	14
11	44	24	54	10
12	41	31	53	13
13	46	27	54	13
14	46	20	71	12

In compliant concept formation, the level achieved by the Patrol is not surpassed by any of the clinical groups, although it is equalled by the Neurotics and the Preschizophrenics. In active concept formation, the Patrol is exceeded in the percentage of abstract-conceptual definitions by the Obsessive-Compulsives and Hysterics.

Figure 38 represents the percentage of definitions on an abstract-conceptual level in all the groups on Part I; it indicates that the greatest impairment of this level occurs in the Chronic and Deteriorated Schizophrenics, the Simple Schizophrenics, the Depressives, and the depressive-like Neurotics; these groups fluctuate between 30% and 40%. Thus we see again that malignant disorders are the ones which impair this aspect of concept formation.

Figure 38 also represents the percentage in all our groups of abstract-conceptual

TABLE 92.—*Average Percentage of the Different Conceptualizations*

Group	No. of Cases	Percentage of:									
		CD	FD	C	S	S/N	Fab.	Symb.	F	M	Ch
					Part I of Sorting Test						
U Sch A	8	51	14	14	3	4	4	1	6	1	—
U Sch Ch	10	37	11	26	3	2	5	—	6	7	3
U Sch D	4	29	4	13	—	4	16	14	4	18	—
P Sch A	8	44	13	23	13	—	1	—	1	4	—
P Sch Ch	8	37	11	19	1	—	21	—	6	6	—
P Sch D	3	33	14	10	3	4	3	—	10	24	—
P Co	13	50	14	17	3	—	3	—	4	9	—
S S	7	29	27	23	—	1	—	—	1	19	—
Pr C	11	49	17	14	6	3	—	—	1	7	—
Pr O-I	12	49	19	11	6	1	—	—	6	7	—
DP + DI	7	37	20	26	1	1	—	—	1	16	—
DSN + DN	13	36	19	19	1	1	2	—	3	17	—
Hy	15	64	9	7	6	—	3	—	4	7	1
MN	6	47	9	33	3	—	—	—	4	6	—
O-C	12	62	18	7	4	—	3	—	1	4	—
A & D	8	39	16	21	1	1	1	—	4	16	—
Neuras	5	39	16	23	—	3	4	—	4	11	—
P (1)	32	51	14	20	3	—	1	—	3	9	—
P (2)	17	47	16	16	3	3	1	—	3	10	—
P (3)	5	53	6	24	4	6	1	—	6	—	—
					Part II of Sorting Test						
U Sch A	8	62	8	2	18	5	1	—	3	3	—
U Sch Ch	10	61	6	2	24	2	1	—	1	3	—
U Sch D	4	19	7	5	36	1	8	—	8	17	—
P Sch A	8	43	11	11	17	7	2	2	3	7	—
P Sch Ch	8	54	8	1	11	8	11	1	3	5	—
P Sch D	3	53	10	8	3	4	—	4	7	11	—
P Co	13	66	6	1	11	3	—	—	8	7	—
S S	7	57	12	3	8	8	—	—	1	12	—
Pr C	11	66	7	1	12	4	3	—	3	4	—
Pr O-I	12	69	5	2	15	3	3	1	3	2	—

TABLE 92—*Continued*

Group	No. of Cases	Percentage of:									
		CD	FD	C	S	S/N	Fab.	Symb.	F	M	Ch
Part II of Sorting Test—*Continued*											
DP + DI	7	42	11	4	8	13	8	—	2	13	—
DSN + DN	13	50	10	3	13	7	1	—	4	13	—
Hy	15	73	4	1	8	7	—	—	1	6	—
MN	6	64	7	—	18	4	—	—	3	4	—
O-C	12	67	8	1	10	6	—	—	1	8	—
A & D	8	63	4	—	10	5	—	1	3	15	—
Neuras	5	40	8	6	9	10	1	—	3	23	—
P (1)	32	73	6	1	7	4	—	—	4	5	—
P (2)	17	68	6	3	10	6	1	—	3	5	—
P (3)	5	67	4	1	14	8	—	—	2	5	—

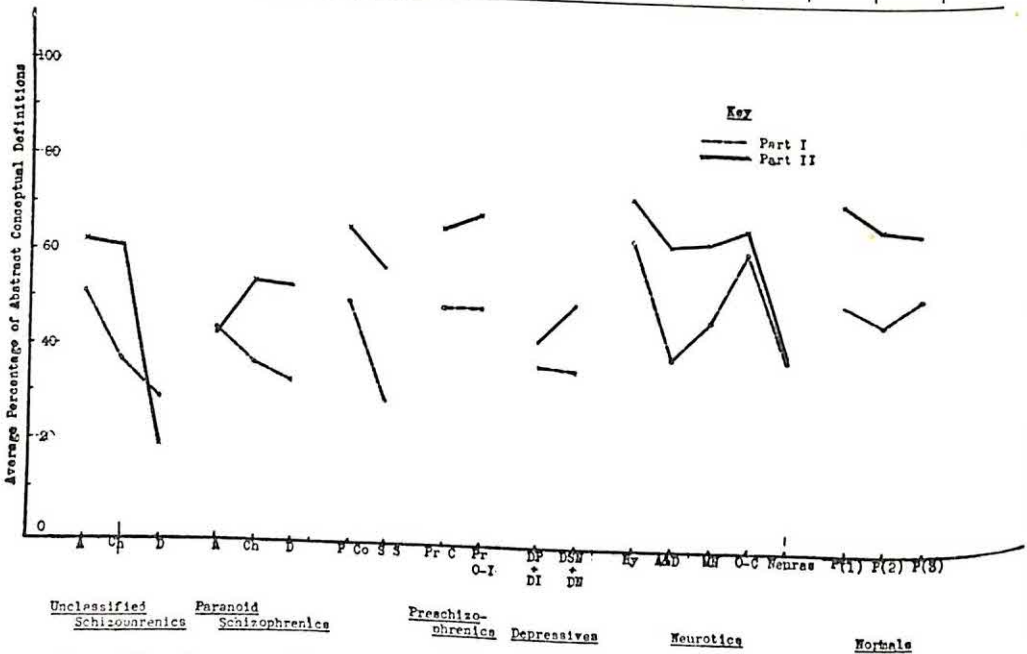


FIG. 38.—SORTING TEST: ABSTRACT CONCEPTUAL DEFINITIONS ON PART I AND PART II

Group Averages of Percentages

definitions on Part II. It indicates that the treatest impairment occurs in the Deteriorated Unclassified Schizophrenics, only one-fifth of whose responses remain on this level. Next in extent of impairment are the Depressive Psychotics and the Neurasthenics, two-fifths of whose responses are abstract-conceptual definitions.

TABLE 93.—*Averages of Abstract Conceptual Definitions and Significance of the Differences*

Group	M	Group	M	"t"	Significance
Part I of Sorting Test					
Patrol	3.5	(P + U) Sch Ch	2.6	2.12	2–5%
		(P + U) Sch D	2.1	2.32	2–5%
		SS	2.0	2.61	<1%
		Depr	2.6	2.38	1–2%
		O-C + Hy	4.4	2.61	<1%
		A & D + Neuras	2.7	1.17	20–30%
O-C + Hy	4.4	U Sch A	3.6	1.19	20–30%
		P Sch A	3.1	2.25	2–5%
		(P + U) Sch Ch	2.6	3.82	<1%
		(P + U) Sch D	2.1	3.76	<1%
		SS	2.0	4.32	<1%
		Pr (C + O-I)	3.4	2.36	1–2%
		Depr	2.6	4.45	<1%
		A & D + Neuras	2.7	3.29	<1%
		MN	3.3	1.69	5–10%
(P + U) Sch A	3.4	(P + U) Sch Ch	2.6	1.26	20–30%
		(P + U) Sch D	2.1	1.54	10–20%
(P + U) Sch Ch	2.6	(P + U) Sch D	2.1	.66	50–60%
		Pr (C + O-I)	3.4	1.78	5–10%
Patrol Sch	4.0	Patrol Non-Sch	3.6	1.24	20–30%
Part II of Sorting Test					
Patrol	8.5	U Sch (A + Ch)	7.3	2.08	2–5%
		U Sch D	2.3	19.45	<<1%
		P Sch A	5.2	4.10	<1%
		P Sch (Ch + D)	6.5	2.74	<1%
		SS	6.8	2.02	2–5%
		DP + DI	5.0	4.41	<1%
		DSN + DN	6.0	3.33	<1%
		A & D + MN	7.6	1.48	10–20%
		Neuras	4.8	4.03	<1%
O-C + Hy	8.4	SS	6.8	1.59	10–20%
		DP + DI	5.0	3.68	<1%
		DSN + DN	6.0	2.52	1–2%
		A & D + MN	7.6	1.09	20–30%
		Neuras	4.8	3.40	<1%
A & D + MN	7.6	P Sch (Ch + D)	6.5	1.02	30–40%
		DP + DI	5.0	2.59	1–2%
		DSN + DN	6.0	1.34	10–20%
		Neuras	4.8	2.49	2–5%
		P (1)	8.8	1.78	5–10%
U Sch (A + Ch)	7.3	U Sch D	2.3	3.99	<1%
Patrol Anx	8.2	Patrol Non-Anx	9.1	1.61	10–20%
P (1)	8.8	P (2)	8.0	1.48	10–20%

The Paranoid Schizophrenics and the Depressive Neurotics follow next. In the Unclassified and Paranoid Schizophrenics, it is significant to note that the Chronic cases are as good as or better than the others. This trend to be well-retained on an abstract-conceptual level on Part II is apparently correlated with the "good front" and "ambulatory" character of many of the Chronic cases. However, the impairment of their active concept formation on Part I is in strong contrast with their good compliant concept formation on Part II, and they reveal themselves by this pattern.

It is further noteworthy that the Preschizophrenics, who showed significant loosening in active sorting on Part I, reach the normal percentage of abstract-conceptual responses on the second part; thus, although their sorting may be loose, they verbalize their sortings on an abstract-conceptual level.

(c) Abstract-Conceptual Responses: "*t*"-Test.

Table 93 presents the "*t*"-test of the significance of the differences of the mean number of the abstract-conceptual responses between our groups on both parts of the test.

On Part I, the Patrol does significantly better than the Simple, Chronic, and Deteriorated Schizophrenics, and the Depressives; but it is significantly poorer than the combined Obsessive-Compulsive and Hysteric groups. It is interesting to note that on Part I the Acute Schizophrenics have an average number of abstract-conceptual responses almost identical with that of the Patrol, and show a trend to be better than the Chronic and Deteriorated Schizophrenics. The combined Obsessive-Compulsive and Hysteric groups are significantly superior to all other groups.

On Part II, the Patrol is the best of all our groups, and slightly exceeds even the combined Obsessive-Compulsives and Hysterics. The Patrol averages 8.5 abstract-conceptual definitions out of 12 chances; it is significantly differentiated from all the Schizophrenics, Depressives, and Neurasthenics, and shows a trend to be better than the Neurotic groups of intermediate efficiency (Anxiety and Depression group, and Mixed Neurotics). In general, the same trends are true for the combined Obsessive-Compulsives and Hysterics. The Neurasthenics are significantly inferior to even the Neurotic groups of intermediate efficiency; and the latter are also significantly superior to the Depressive Psychotics, and show a trend to be superior to the Depressive Neurotics.

It is noteworthy that on Part II the Acute Paranoid Schizophrenics suffer especial impairment of their conceptual level of definition, and are inferior to even the Chronic and Deteriorated Paranoid Schizophrenics. On the other hand, the Acute and Chronic Unclassified Schizophrenics are significantly superior to the Deteriorated Unclassified Schizophrenics. Thus, again we find a difference between the Paranoid and Unclassified groups, in that the former improves, while the latter is impaired with the progression of the schizophrenic process.

The Patrol breakdown into Anxious and Non-Anxious, and into Borderline-Adjusted and Well-Adjusted, segments reveals that anxiety and precarious adjustment encroach upon the conceptual level of compliant concept formation.

(d) Abstract-Conceptual Definitions: Chi^2 Test.

Tables 94 and 95 present the percentage distribution of our cases into three ranges of incidence of abstract-conceptual definitions, on both parts of the test, and the differential significance of these distributions.

In frequency of abstract-conceptual definitions on Part I, it is obvious that the non-depressive Neurotic groups—Obsessive-Compulsive, Hysteric, and Mixed Neurotic—do best; they are followed by the Patrol, the Schizophrenics, the depressive-like Neurotics, and finally by the Depressives. The statistical differentiation of these groups is more or less sharp.

On Part II, the Patrol is the most superior; it is followed by the non-depressive Neurotics, then by the Schizophrenics and the depressive-like Neurotics, and finally by the Depressives, who again are most inferior. The Patrol and the non-depressive Neurotics are significantly differentiated from the other three groups.

TABLE 94-A.—*Percentage of Cases with C.D. on Part I*

Group	No. of Cases	Percentage of Cases with:		
		0–2	3–4	5–7
(P + U) Sch	41	46	37	17
Depr	20	60	35	5
O-C + Hy + MN	33	18	43	39
A & D + Neuras	13	54	31	15
Patrol	54	26	50	24

TABLE 94-B.—*Differential Significance of Distribution of Cases*

Groups Compared	Chi^2 (d.f. = 2)	Significance
(P + U) Sch : Depr	1.93	30–50%
(P + U) Sch : (O-C + Hy + MN)	7.78	2%
(P + U) Sch : Patrol	4.30	10–20%
Depr : (O-C + Hy + MN)	12.03	<1%
Depr : Patrol	8.45	1–2%
(O-C + Hy + MN) : (A & D + Neuras)	6.04	2–5%
(O-C + Hy + MN) : Patrol	2.38	30%
(A & D + Neuras) : Patrol	3.72	10–20%

(e) Abstract-Conceptual Definitions: Summary.

We conclude that (1) on Part I, the abstract-conceptual level of concept formation shows its greatest impairment in schizophrenic chronicity and deterioration, in Depressive Psychoses, or Depressive Neuroses, and in Neuroses with depressive-like coloring. (2) On Part II, the same trends hold true except that the Chronic Schizophrenics may show up much better; this pattern is also true of the Anxiety and Depression group, who retain sufficient organization to comply well with the conceptual norms of society. (3) In general, not only the adequacy of concept formation but also its level is much better where compliance with social norms is required than where active thinking is required. (4) Poor cultural background in Normals is a handicap for achieving an abstract level of active concept formation. (5) Approximately half of the responses on Part I, and two-thirds on Part II, of the test should be abstract-conceptual; otherwise impairment is indicated. (6) Anxiety and maladjustment encroach on the level of compliant concept formation, even within the "normal" range. (7) Although functional definitions are more frequent where active concept formation is required than where compliant concept formation is required, they are almost always much less frequent than abstract-conceptual definitions. The most significant exception is in the Simple Schizophrenic group, which has about an equal amount of each, neither very high; to a lesser extent, this is true of the Depressive groups.

TABLE 95-A.—*Percentage of Cases with C.D. on Part II*

Group	No. of Cases	Percentage of Cases with:		
		0–5	6–9	10–12
(P + U) Sch	41	39	51	10
Depr	20	45	40	15
O-C + Hy + MN	33	12	64	24
A & D + Neuras	13	38	54	8
Patrol	54	7	63	30

TABLE 95-B.—*Differential Significance of Distribution of Cases*

Groups Compared	Chi² (d.f.= 2)	Significance
(P + U) Sch : (O-C + Hy + MN)	7.64	2–5%
(P + U) Sch : (Patrol)	16.03	<<1%
Depr : (O-C + Hy + MN)	7.29	2–5%
Depr : Patrol	14.39	<<1%
(A & D + Neuras) : (O-C + Hy + MN)	4.85	5–10%
(A & D + Neuras) : Patrol	9.25	1%

(f) Concretistic Definitions: Chi² and "*t*"-Tests.

Table 92 shows that concretistic definitions, like functional definitions, are much more frequent on Part I, where active concept formation is required, than on Part II where compliant concept formation is required.

The *percentage* of concretistic definitions shows no clear-cut group trends. However, in Table 96, which presents the *average number* of concretistic responses in different groups, some trends do emerge. On Part I, the combined Obsessive-Compulsives and Hysterics—consistently the most efficient—have only an average of .5 concretistic definitions; they are significantly superior to the other Neurotics, the Depressives, and even the Patrol, which has an average of 1.3. This average in the Patrol is significant, since it had fewer abstract-conceptual responses on this part than the Obsessive-Compulsives and Hysterics; we may conclude that its cultural background tends to keep the Patrol on a somewhat concretistic level of concept formation. The combined Preschizophrenic groups appear to have relatively few concretistic responses—.9 in average—and are more or less significantly better than the Depressive and depressive-like groups.

TABLE 96.—*Averages of Concretistic Definitions and Significance of Differences*

Group	M	Group	M	"t"	Significance
		Part I of Sorting Test			
O-C + Hy	.5	Depr	1.4	3.84	<1%
		MN	2.3	5.29	<1%
		A & D + Neuras	1.5	4.30	<1%
		Patrol	1.3	4.03	<1%
Pr (C + OI)	.9	DP + DI	1.8	2.43	2–5%
		DSN + DN	1.3	1.45	10–20%
		A & D + Neuras	1.5	2.18	2–5%
(U + P) Sch Ch	1.6	(U + P) Sch D	.8	1.68	5–10%
Patrol Sch	.9	Patrol Non-Sch	1.5	1.75	5–10%
		Part II of Sorting Test			
Patrol	.2	P Sch	.7	2.71	<1%
		Neuras	.7	2.73	<1%
Neurotics − Neuras	.1	P Sch	.7	3.16	<1%
		Depr	.5	3.11	<1%
		Neuras	.7	3.57	<1%
P Sch	.7	U Sch	.3	1.36	10–20%
		Pr (C + OI)	.1	2.17	2–5%
		P Co	.1	1.72	5–10%
Patrol Depr	.3	Patrol Non-Depr	.1	2.18	2–5%

On Part II, however, the Patrol does much better with regard to the incidence of concretistic definitions. Only three groups are here outstanding with concretistic definitions: the Neurasthenics, the Paranoid Schizophrenics, and the Depressives. These three groups are more or less significantly differentiated from the Patrol, the Neurotics, and the Preschizophrenics. The Paranoid Schizophrenics even show a trend to be worse than the Unclassified Schizophrenics and the Paranoid Conditions. None of the averages is very great, .7 being the highest.

We see also that, on Part I, the Schizoid Normals tend to have fewer concretistic definitions than the Non-Schizoid Normals; and that, on Part II, a tendency toward depressive mood swings in Normals significantly increases the incidence of concretistic definitions. Again the numbers are very small, and represent a low incidence of concretistic definitions even in the most inferior groups.

Because of this low incidence, it is not too revealing to work with averages. Table 97 presents the analysis of the number of cases in the different major groups having one or more concretistic definitions. This incidence is greatest in the Neurasthenics, and next greatest in the Schizophrenics and Depressives. The Neurotics, excluding the Neurasthenics, and the Patrol have less than 10% of their cases with one or more concretistic definitions.

We conclude that, in general, concretistic definitions on both parts of the test are most frequent in Depressives, Neurotics with depressive trends, and Schizophrenics, especially the Paranoid Schizophrenics. There is a slight tendency, in Normals with a limited cultural background, for a higher incidence of concretistic definitions in active concept formation.

TABLE 97-A.—*Percentage of Cases with C on Part II*

Group	No. of Cases	Percentage with	
		0	>0
(P + U) Sch	41	78	22
Depr	20	80	20
(Neurotics − Neuras)	41	95	5
Neuras	5	60	40
Patrol	54	91	9

TABLE 97-B.—*Differential Significance of Distribution of Cases*

Groups Compared	Chi^2 (d.f. = 1)	Significance
(P + U) Sch : (Neurotics − Neuras)	3.78	5%
(P + U) Sch : Patrol	2.06	10–20%
Depr : (Neurotics − Neuras)	1.97	10–20%
Depr : Patrol	.73	30–50%
Neuras : (Neurotics − Neuras)	1.60	20%
Neuras : Patrol	1.72	10–20%

(g) Syncretistic Definitions: Chi^2 and "*t*"-Tests.

Table 92 shows that the *percentage* of syncretistic definitions is generally greater on Part II than on Part I. On Part I, the only group with an outstanding percentage of such definitions is the Acute Paranoid Schizophrenic group with 13%. Thus, accumulation of syncretistic definitions on Part I is most indicative of this group. On Part II, it is the Unclassified Schizophrenics whose syncretistic definitions are outstanding; there is a progressive increase of these with increasing deterioration (18%—24%—36%). In the Paranoid Schizophrenics, there is a decrease with deterioration (17%—11%—3%). Here again is the reverse relationship of Paranoid and Unclassified Schizophrenics.

Table 98 presents the *t*-test of the significance of the difference between the *average number* of syncretistic definitions in the different groups on both parts of the test. It shows that, on Part I, the Acute Paranoid Schizophrenics are more or less statistically differentiated from the other groups, even from the other Schizophrenics. In the incidence of syncretistic definitions on Part II, the Acute Unclassified and Paranoid Schizophrenics are significantly different from the Neurotics, the Depressive Psychotics, and the Normals. On this part, only the Deteriorated Unclassified Schizophrenics exceed significantly the combined Acute Schizophrenics in the number of syncretistic definitions. The Mixed Neurotics, surprisingly, show up with an average number of syncretistic definitions about the same as that of the Acute Schizophrenics, and are significantly worse than the Patrol and the rest of the Neurotics. We have already indicated that we do not have a clinical explanation for the impairment of Mixed Neurotics on the Sorting Test.

TABLE 98.—*Averages of Syncretistic Concepts and Significance of Differences*

Group	M	Group	M	"*t*"	Significance
		Part I of Sorting Test			
P Sch A	.9	U Sch	.2	2.35	2–5%
		P Sch (Ch + D)	.4	1.21	20–30%
		Pr (C + OI)	.4	1.65	10–20%
		Neurotics – Neuras	.3	2.22	2–5%
		Patrol	.2	3.09	<1%
Patrol Sch	.5	Patrol Non-Sch	.1	2.73	<1%
		Part II of Sorting Test			
(U + P) Sch A	2.1	U Sch Ch	2.9	.98	30–40%
		U Sch D	4.3	6.63	<1%
		P Sch Ch	1.3	1.16	20–30%
		P Sch D	.3	1.90	5–10%
		DP + DI	.9	1.78	5–10%
		Neurotics – MN	1.1	2.75	<1%
		Patrol	1.0	2.81	<1%
MN	2.2	Neurotics – MN	1.1	2.24	2–5%
		Patrol	1.0	2.10	2–5%
Pr (C + OI)	1.6	Patrol	1.0	1.85	5–10%
Patrol Sch	1.2	Patrol Non-Sch	.9	.71	40–50%

The Preschizophrenics, following the Schizophrenic trend, tend strongly to be differentiated from the Patrol. In the Patrol breakdown into the Schizoid and Non-Schizoid segments, the Schizoid Patrol has significantly more syncretistic definitions than the Non-Schizoid Patrol on Part I, but not on Part II. Nevertheless, it is apparent that schizoid trends within the "normal" range will manifest themselves by syncretistic tendencies. These will be even more apparent in the Preschizophrenics, and still more in frank Schizophrenics, especially of the Unclassified type.

Table 99 presents the percentage of cases in each of the major groups with one or more syncretistic definitions on Part I. The Schizoid segment of the Patrol has the greatest percentage of such cases; the next greatest is found in the Preschizophrenics, followed by the full-blown Schizophrenics. This is the same sequence found in the incidence of essential loosening. Hence, not only the concept span becomes loose and vague, but also the definitions of the sortings based on that concept span. Here again we have a potent diagnostic indicator for the early, rather than the acute, stages of the schizophrenic disorder, tapping even its equivalent in "normal" character structure.

TABLE 99-A.—*Percentage of Cases with Syncretistic Concepts on Part I*

Group	No. of Cases	Percentage with	
		0	>0
(P + U) Sch	41	85	15
Pr (C + O-I)	23	78	22
Depr	20	100	0
Neurotics	46	89	11
Patrol	54	91	9
Patrol Sch	12	75	25
Patrol Non-Sch	42	95	5

TABLE 99-B.—*Differential Significance of Distribution of Cases*

Groups Compared	Chi^2 (d.f. = 1)	Significance
(P + U) Sch : Depr	1.81	10–20%
(P + U) Sch : Patrol Non-Sch	1.33	20–30%
Pr (C + OI) : Depr	3.03	5–10%
Pr (C + OI) : Patrol Non-Sch	2.87	5–10%

Table 100 presents a similar analysis of the incidence of syncretistic definitions on Part II. Here it is the Schizophrenics and Preschizophrenics who have the greatest percentage of cases, significantly more than the other major groups. No trend for the Schizoid Patrol to have such cases on Part II was detected, a finding which again attests to the sturdiness of compliant concept formation and indicates the pathological implications of a massing of syncretistic definitions on this part. It should be remembered that syncretistic definitions represent a loosening of the conceptual *content*, just as an enlarged concept span represents a loosening of conceptual *realm*. In other words, loose sortings and syncretistic definitions are two aspects of the same disturbance; but an accumulation of syncretistic definitions, especially on Part II, is necessary before diagnostic conclusions can be drawn.

We conclude that (1) massing of syncretistic definitions on Part I of the test is characteristic for Schizoid Normals, Preschizophrenics, and Acute Paranoid Schizophrenics. (2) Massing in Part II is a more malignant indicator, present only in Preschizophrenics and Schizophrenics. (3) Paranoid Schizophrenics have fewer, and Unclassified Schizophrenics have massed, syncretistic definitions with increasing deterioration.

(h) Frequency of Failures.

An item is considered failed on Part I if no sorting is made; on Part II if no definition is offered.

Table 101 shows that, on Part I, four groups have a relatively high frequency of failures: the Depressives, the Deteriorated Schizophrenics, the Simple Schizophrenics, and the Anxiety and Depression group. These groups are more or less significantly differentiated from the other groups. These trends hold true on Part II, except that the Neurasthenics are added, and have actually the highest incidence of failures. Here again these groups are more or less significantly differentiated from the others.

Table 102 presents the *percentage* of cases in the major clinical groups with more than one failure on Part II. The two depressive-like Neurotic groups far exceed all the others, the next worst being the major Depressive group.

TABLE 100-A.—*Percentage of Cases with Syncretistic Concepts on Part II*

Group	No. of Cases	Percentage with		
		0	1–4	>4
(P + U) Sch	41	32	59	10
Pr (C + O-I)	23	22	78	—
Depr.	20	65	30	5
Neurotics	46	50	50	—
Patrol	54	57	43	—

TABLE 100-B.—*Differential Significance of Distribution of Cases*

Groups Compared	Chi² (d.f. = 1)	Significance
(P + U) Sch : Depr.	6.04	2–5%
(P + U) Sch : Neurotics	6.50	2–5%
(P + U) Sch : Patrol	9.92	<1%
Pr (C + OI) : Depr.	6.54*	1%
Pr (C + OI) : Neurotics	3.97*	2–5%
Pr (C + OI) : Patrol	6.87*	<1%

* 2 x 2 comparison: "0" or ">0".

We conclude that failures on both parts of the test are most frequent where depressive trends, or a Simple or Deteriorated Schizophrenia, are present. On Part II, the Neurotic groups with depressive trends tend to have the most failures. It may be that their better hold on reality prevents wild or incorrect definitions, but that the manifold properties of the objects set out by the examiner confuse them hopelessly, and consequently they do not offer any definition.

TABLE 101.—*Averages of Failures and Significance of Differences*

Group	M	Group	M	"t"	Significance
		Part I of Sorting Test			
Patrol	.6	(P + U) Sch D	1.45	2.54	1–2%
		SS	1.3	2.43	1–2%
		Depr	1.25	2.91	<1%
		A & D	1.15	1.73	5–10%
O-C + Hy + MN	.45	Depr	1.25	3.46	<1%
		A & D	1.15	2.28	2–5%
(P + U) Sch (A + Ch)	.3	(P + U) Sch D	1.45	2.96	<1%
		SS	1.3	3.01	<1%
Patrol Anx	.4	Patrol Non-Anx	.9	2.44	1–2%
		Part II of Sorting Test			
Patrol	.6	(P + U) Sch D	1.7	3.23	<1%
		SS	1.4	2.40	1–2%
		Depr	1.6	3.31	<1%
		A & D	1.8	3.39	<1%
		Neuras	2.8	5.49	<1%
O-C + Hy + MN	.8	Depr	1.6	2.00	2–5%
		A & D	1.8	1.98	2–5%
		Neuras	2.0	3.34	<1%
(U + P) Sch (A + Ch)	.5	(P + U) Sch D	1.7	2.72	<1%
		SS	1.4	2.08	2–5%
Depr	1.6	P Co	.9	1.22	20–30%
		Pr (C + O-I)	.3	2.94	<1%

(i) Fabulations: Chi^2 and "*t*"-Tests.

Tables 103 and 104 present the *percentage* of cases in the major clinical groups with fabulations on both parts of the test. On Part I, the Schizophrenics exceed all other groups in the incidence of fabulation; on Part II, they again have a high incidence, but are exceeded by the Neurotic Depressives. This trend in the Neurotic Depressives, as in their loose groupings on Part I, is probably due to the presence of schizoid cases among them.

TABLE 102-A.—*Percentage of Cases with Failures on Part II*

Group	No. of Cases	Percentage with:	
		0	>0
(P + U) Sch	41	80	20
Depr	20	70	30
O-C + Hy + MN	33	88	12
A & D + MN	13	38	62
Patrol	54	91	9

TABLE 102-B.—*Differential Significance of Distribution of Cases*

Groups Compared	Chi² (d.f. = 1)	Significance
(P + U) Sch : Patrol	1.30	20–30%
Depr : Patrol	3.46	5–10%
(A & D + Neuras) : Sch	6.47	1%
(A & D + Neuras) : Depr	2.05	10–20%
(A & D + Neuras) : O-C + Hy + MN	9.39	<1%
(A & D + Neuras) : Patrol	15.12	<<1%

TABLE 103-A.—*Percentage of Cases with Fabulations on Part I*

Group	No. of Cases	Percentage with:	
		0	>0
(P + U) Sch	41	78	22
Depr	20	95	5
Neur	46	91	9
Patrol	54	94	6

TABLE 103-B.—*Differential Significance of Distribution of Cases*

Groups Compared	Chi² (d.f. = 1)	Significance
(P + U) Sch : Depr	1.72	10–20%
(P + U) Sch : Neurotics	2.04	10–20%
(P + U) Sch : Patrol	4.29	2–5%

It appears that in Part I fabulations are more potent diagnostic indicators, and here, like syncretistic definitions and loose sortings, they are generally indicative of schizophrenia.

TABLE 104-A.—*Percentage of Cases with Fabulations on Part II*

Group	No. of Cases	Percentage with:	
		0	>0
(P + U) Sch	41	85	15
DP + DI	7	100	0
DSN + DN	13	77	23
Neurotics	46	100	0
Patrol	54	98	2

TABLE 104-B.—*Differential Significance of Distribution of Cases*

Groups Compared	Chi^2 (d.f. = 1)	Significance
(P + U) Sch : Neurotics	5.13	2–5%
(P + U) Sch : Patrol	3.86	5%

TABLE 105.—*Averages of Fabulations and Significance of Differences*

Group	M	Group	M	"t"	Significance
		Part I of Sorting Test			
Patrol	.1	P + U Sch	.6	2.73	<1%
		P Sch Ch	1.5	4.22	<1%
		U Sch D	1.1	3.47	<1%
Neurotics – Neuras	.1	P + U Sch	.6	2.11	2–5%
		P Sch Ch	1.5	3.49	<1%
		U Sch D	1.1	2.74	<1%
		Part II of Sorting Test			
Patrol	0	P + U Sch	.4	1.96	5%
		P Sch Ch	1.3	3.14	<1%
		U Sch D	1.0	4.98	<1%
Neurotics – Neuras	0	P + U Sch	.4	1.72	5–10%
		P Sch Ch	1.3	2.76	<1%
		U Sch D	1.0	4.92	<1%
(P + U) Sch A	.2	P Sch Ch	1.3	1.37	10–20%
DP + DI	.9	DSN + DN	.1	1.19	20–30%

Table 105 presents the *t*-test of the difference between the average number of fabulations in each group. Particularly the Chronic Paranoid Schizophrenics are shown to have many fabulations on both parts.

(j) Frequency of Split-Narrow Definitions.

The split-narrow definitions are almost entirely absent in Part I, and our results refer to Part II only.

Table 106 presents the *t*-test of the significance of the difference of *averages* of our groups for this type of response. The Depressive Psychoses far exceed other groups, and are sharply differentiated. Only the Neurasthenics approach them.

TABLE 106.—*Averages of Split Narrow Definitions and Significance of Differences*
Part II of Sorting Test

Group	M	Group	M	"t"	Significance
DP + DI	1.6	U Sch	.3	3.24	<1%
		P Sch	.8	1.91	5–10%
		Neurotics – Neuras	.7	2.23	2–5%
		Patrol	.6	2.89	<1%
Neuras	1.2	Neurotics – Neuras	.7	1.11	20–30%

TABLE 107-A.—*Percentage of Cases with Split Narrow Definitions on Part II*

Group	No. of Cases	Percentage with:	
		0–1	>1
(P + U) Sch	41	95	5
Depr	20	65	35
Neurotics – Neuras	41	80	20
Neuras	5	60	40
Patrol	54	87	13

TABLE 107-B.—*Differential Significance of Distribution of Cases*

Groups Compared	Chi² (d.f. = 1)	Significance
Depr : (P + U) Sch	7.45	<1%
Depr : (Neurotics – Neuras)	2.22	10–20%
Depr : Patrol	3.30	5–10%

Table 107 presents the *percentage* of cases in our major groups having more than one split-narrow response. Here the Neurasthenics have about the same percentage as the combined Depressives.

(k) Frequency of Symbolic and Chain Definitions.

The incidence of these definitions is so low in our material that no statistical evaluation is possible. We can only say that the symbolic responses on Part I occur almost exclusively in the Deteriorated Unclassified Schizophrenics, and on Part II almost exclusively in the Paranoid Schizophrenics. Chain responses are extremely rare and occur on Part I occasionally, but almost exclusively in the schizophrenic groups.

F. GENERAL CONCLUSIONS

Our statistical analysis has thus far been confined to the differentiation of groups by means of the incidence of single features. We have discussed the pathological implications of *inadequacy* of active sorting and of verbalization, of *looseness* or *narrowness* of the concept span, and of the different types of departure from the *abstract-conceptual level* of definition. The next step is to determine to what extent the accumulation of these features is significant for differential diagnosis; and whether it is the accumulation of only certain diagnostic indicators which is significant, or whether the problem is one merely of gross massing of indicators.[11]

Later in this section we shall describe the outstanding features of the Sorting Test performance in the different clinical and control groups. Before doing so, however, let us turn to a brief analysis of the differential significance of the accumulation of diagnostic indicators. In other words, let us see whether we can draw merely from the massing of diagnostic indicators—independent of which ones they are—diagnostic conclusions.

On the basis of clinical experience we have chosen for this purpose the following diagnostic indicators:[12]

(1) Fewer than five adequate or nearly adequate (plus or plus/minus) sortings on Part I.
(2) Two or more loose sortings on Part I.
(3) Fewer than three abstract-conceptual definitions on Part I.
(4) One or more syncretistic definitions on Part I.
(5) More than one fabulated or symbolic definition on Part I.
(6) Fewer than eight adequate or nearly adequate definitions on Part II
(7) Fewer than six conceptual definitions on Part II.
(8) More than two syncretistic definitions on Part II.
(9) More than two fabulated or symbolic definitions on Part II.

Table 108-A presents the percentage of cases in our major groups having more than two of these nine indicators. The greatest incidence of such cases occurs in the Unclassified Schizophrenics (54%) and the Paranoid Schizophrenics (47%). Only two groups approach these: the total combined Depressives (45%) and the two depressive-like Neurotic groups combined with the Mixed Neurotics (42%), who are generally inadequate on this test. The Patrol has the lowest incidence of all, 9%. The combined Hysterics and Obsessive-Compulsives are next best with 15%.

---

[11] A similar question was raised in our analysis of scatter on the Bellevue Scale and on the Babcock Test. There we advanced the contention—as well as some statistical proof for its validity—that it is not widespread and general impairment, but rather the *pattern of impairment*—impairment on some but not on other subtests—which is most significant for diagnostic purposes.

[12] In this analysis we do not use the number of very narrow sortings on Part I as a diagnostic indicator, because its occurrence is widespread through all our groups—even the Normals—and because narrow sortings may have any one of at least four different implications, discernible in observation of performance but not yet distinguished by scoring: extreme meticulousness, inertia, blocking, or extremely concrete attitude toward the objects. The reader may note that, in terms of our previous analyses, the limits used here are in some instances rigorous, and hence may unduly penalize subjects who are not actually very impaired on the Sorting Test. Nevertheless, on the basis of clinical experience, we believe that these limits are on the borderline of impairment, and that scores falling below or just beyond these limits indicate at least a tendency toward impairment.

TABLE 108-A.—*Percentage of Cases with 3 or More Signs of Impairment*

Group	No. of Cases	Percentage with 3 or more:
U Sch	22	56
P Sch	19	47
(P + U) Sch	41	51
P Co	13	15
SS	7	29
Pr (C + OI)	23	35
Depr	20	45
Hy + O-C	27	15
MN + A & D + Neuras	19	42
Patrol	91	9

TABLE 108-B.—*Differential Significance of Distribution of Cases*

Groups Compared	Chi^2 (d.f. = 1)	Significance
(P + U) Sch : (Hy + O-C)	6.99	<1%
(P + U) Sch : Patrol	15.95	<<1%
Pr (C + OI) : (Hy + O-C)	1.73	10–20%
Pr (C + OI) : Patrol	5.78	1–2%
Depr : (Hy + O-C)	3.83	5%
Depr : Patrol	9.32	<1%
(MN + A & D + Neuras) : (Hy + O-C)	3.01	5–10%
(MN + A & D + Neuras) : Patrol	8.24	<1%

Table 108-B shows that the Patrol, as well as the combined Hysterics and Obsessive-Compulsives, are more or less significantly differentiated from the Schizophrenics, the Preschizophrenics, the Depressives, and the inefficient Neurotic groups.

One may wonder why the Depressives and the inefficient Neurotics have a percentage of such cases which comes close to that of the Schizophrenic groups. It will be remembered that these groups showed their greatest weaknesses on *adequacy* and *conceptual* level on one or both parts of the test. However, loose groupings, syncretistic and/or fabulated responses were not characteristic for them, but were for the Schizophrenics.

If we therefore exclude the diagnostic indicators 1, 3, 6, and 7, dealing with adequacy and conceptual level, and analyze the percentage distribution of cases with respect to the five remaining diagnostic indicators, we obtain a finer differentiation.

These results are presented in Table 109, which gives the percentage of cases in the major groups having *none*, *one*, or *more than one* of these five indicators. It is the last column which is diagnostically significant, inasmuch as we see that here the Schizophrenics far exceed all other major groups and are approached only by the Preschizophrenics. The Depressives, who previously had a percentage in the pathological range close to that of the Schizophrenics, now have only 5%—actually, one case. It is true that the number of Schizophrenics has decreased from about one-half to about one-third of the group. Actually in individual diagnoses, this is not the case; these five indicators show only that among those cases caught by the nine indicators, the Schizophrenics can be sharply distinguished from the Depressives by excluding indicators 1, 3, 6 and 7.

TABLE 109.—*Percentage of Cases with "Schizophrenic" Signs of Impairment*

Group	No. of Cases	Percentage with:		
		0	1	>1
(P + U) Sch.	41	37	32	32
Pr (C + OI)	23	57	26	17
Depr.	20	50	45	5
Neurotics	46	67	30	2
Patrol	54	67	24	9

Thus, of the Schizophrenics with a massing of these nine indicators, a large number will, in addition to general inadequacy and departure from the abstract-conceptual level, have loose sortings, syncretistic, fabulated or symbolic definitions. This is not true for the Depressives, where only 1 case out of the 20 had more than one of these latter indicators. In clinical diagnostic work, therefore, the inference of the presence of schizophrenic impairment of concept formation is most warranted when these latter diagnostic indicators are massed.

Table 109 also shows that the Neurotics are all rather homogeneous in that only 1 case out of 46 Neurotics has more than one of these diagnostic indicators. In other words, in Depressions, in depressive-like Neuroses, or in other types of Neuroses which impair concept formation, the diagnostic indicators will be almost exclusively those of inadequacy and/or of departure from the abstract-conceptual level of definition. 5 Patrolmen (9%) have more than one of the five indicators which were most successful for the differential diagnosis of Schizophrenia. Of these, 4 were classified as Schizoid. In other words, only 2% of the Non-Schizoid Patrol (1 case out of 41), but 33% of the Schizoid Patrol (4 cases out of 12), massed these indicators. This difference is significant. Thus, even within the "normal" range, these indicators are useful for detecting schizoid character trends.[13]

---

[13] This finding, although based on a small number of cases, derives its significance from its *continuity* with the results obtained on the clinical groups.

The reader may raise the question of why cases other than Schizophrenics have such scores at all. It will be well, therefore, to remind ourselves that in scoring one leans backward, and anything that remotely resembles an L, Fab, etc., is so scored. In practical work, however, the peculiar quality and the massed quantity of these indicators are directly revealing of Schizophrenia.

1. The Patrol. The results on the Patrol will be discussed first in order to provide some yardstick by which to measure impairments in the clinical groups. However, we do not believe that our averages for the Patrol represent what the adequacy, concept span, and conceptual level should be for *all* "normals," partly because of the smallness of the group and partly because of its limited cultural background. If anything, their averages represent a minimum of "normal" efficiency; and this is especially true for Part I.

(a) Adequacy. The total Patrol averages about 75% adequate sortings on Part I; in other words, about 5 out of 7 of their sortings are adequate. We know from the item analysis that one of these two inadequate sortings almost invariably occurs on the *bell* item. But neither the *fork* nor the *pipe* item is likely to be failed. In general, within the "normal" range, there is a decrease of adequacy of active sorting with increasing maladjustment.

On Part II the Patrol averages around 80% adequate definitions; in other words, about 10 out of the 12 items are adequately defined. Again there is a tendency for increasing inadequacy with progressive maladjustment, although the differences are not large.

The presence of anxiety in the Normals tends to increase adequacy on Part I, but seriously disrupts it on Part II; thus there is a significant difference between the Anxious and Non-Anxious Normals in their adequacy of *compliant* concept formation.

(b) The Concept Span. The Patrol as a whole tends to have few loose sortings. However, the most schizoid segment does tend to have loose sortings, and in this respect is significantly differentiated from the Non-Schizoid Patrol. Although in no Patrol case are there more than two essentially loose active sortings, the average of the most schizoid segment is about the same as that of the Unclassified Schizophrenics and the Chronic Paranoid Schizophrenics and exceeds that of the Over-Ideational Preschizophrenics. Mildly loose sortings are also significantly more frequent in the Schizoid Patrol than in the Non-Schizoid Patrol. However, anxiety also increases the incidence of mild loosening of the concept span. Conversely, the Anxious and the Schizoid Patrol tend to have less narrowing than do the Non-Anxious and Non-Schizoid Patrol.

A significant increase of extreme narrowing of the concept span appears to occur in the Inhibited Patrol. However, the Patrol in general has an average of only 1.3 extreme narrowings; if we take into account the very frequent narrowing on the *bell* item, this average means that in the "normal" range there may or may not be *another* extreme narrowing, but more than this is infrequent. In this respect the Patrol is significantly superior to the Depressive groups or the depressive-like Neurotic groups, as well as to some of the Schizophrenic groups.

(c) The Conceptual Level. The conceptual level of the Patrol on Part I is such that only about half of the responses tend to be on the abstract-conceptual level, while another one-third of the responses is likely to be equally distributed between the functional and concrete levels. The Schizoid Patrol tends to be on a somewhat higher conceptual level than the Non-Schizoid Patrol.

On Part II the Patrol averages 8 or 9 abstract-conceptual definitions, which is as good as the most efficient Neurotic groups. Other types of responses do not accumulate, except for some syncretistic definitions. These appear to be more frequent in the Schizoid Patrolmen, which is to be expected because syncretistic definitions, like loose sortings, are vague, generalized, and all-inclusive.

On Part II the presence of anxiety not only disrupts the adequacy of the definitions, but also impairs to some extent the abstract-conceptual level. This is true, however, for almost any tendency toward maladjustment in the "normal" range with subjects who come from a limited cultural background.

(d) Summary. The Patrol in general demonstrates weakness of adequacy and conceptual level where *active* sorting is involved; but it gives adequate definitions on an abstract-conceptual level in *compliant* concept formation. The presence of schizoid trends makes for the occurrence of loose sortings and some syncretistic definitions in active sorting, but also appears associated with a somewhat higher conceptual level. The presence of *anxiety* tends to increase the adequacy of active sorting, though it causes an inclination toward mild loosening; but disrupts the adequacy of compliant concept formation, where it causes some departure from the abstract-conceptual level. *Inhibition* as a personality characteristic tends to cause a somewhat greater incidence of extreme narrowing of the concept span.

2. The Unclassified Schizophrenics.

(a) Adequacy. Active sorting on Part I shows a progressive decrease of adequacy with chronicity and deterioration; the Acute cases are about as adequate as the Patrol. The Chronic and Deteriorated Unclassified Schizophrenics are the most inadequate of all the clinical groups.

The adequacy of verbalization on Part II also shows a progressive decrease with chronicity and deterioration; here, however, the Chronic casse stand closer to the Acute than to the Deteriorated cases, having about two-thirds of the definitions scored as adequate. The Deteriorated group is in this respect the most inadequate of all our groups.

(b) The Concept Span. There are two features of the concept span present in the Schizophrenics, one of which, *loosening*, appears unique to the schizophrenic process, while the other, *narrowing*, is a feature shared with many other groups. The incidence of cases with very loose sorting tends to increase with chronicity and deterioration, although one may also find many such loose sortings in some Acute cases. However, the amount of extreme narrowing also increases with chronicity and deterioration, largely as a consequence of the regressive shift to the concrete level of concept formation, which often prevents sorting altogether; to some extent lack of interest and/or understanding in the Deteriorated cases also contributes to narrow sortings. Thus, with progression from acuteness through chronicity to deterioration, there tends to be a progressive increase of extreme loosening and/or extreme narrowing of the concept span.

(c) The Conceptual Level. On Part I, there is a progressive decrease in the number of abstract-conceptual responses with increasing deterioration; and again the Deteriorated group is the most impaired of all clinical groups. The Chronic cases are, in general, very poor. The Acute cases approximate the level of the Patrol, and differ from it only by an occasional fabulated or symbolic response. The Chronic cases show a great incidence of concretistic definitions, and may also have fabulated and even chain definitions. The Deteriorated cases drop from the abstract-conceptual level, and even from the functional level, to fabulations, symbolic interpretations, and failures.

On Part II the Acute and Chronic cases run not much below the Patrol in incidence of abstract-conceptual definitions. However, both groups show here a relatively great number of syncretistic definitions. The Deteriorated cases are again the most impaired of all our groups: they have twice as many syncretistic responses as any other type of response, more fabulations than most of the groups, and a good number of failures.

(d) Summary. Thus, if in an Unclassified Schizophrenia, both parts of the test are adequately performed with a sufficient number of abstract-conceptual responses, we are likely to be dealing with an Acute case; if the adequacy and conceptual level on Part I are impaired, while these on Part II are better retained, it is more likely to be a Chronic case; if both parts of the test are inadequate and on an impaired conceptual level, it is likely to be a Deteriorated case. Qualitative features of the test performance are also important in distinguishing these three stages of Schizophrenia, since queerness and nonsense increase as one passes from Acute through Chronic to Deteriorated cases.

3. The Paranoid Schizophrenics.

(a) Adequacy. The outstanding feature of the Paranoid Schizophrenics is that impairment does not tend to increase with progressing chronicity and deterioration, and may even decrease. On Part I the Acute cases are the most adequate, and are well within the range of our Normals; the Chronic and Deteriorated cases are somewhat more inadequate, with no real difference between them. They tend to be adequate on about two-thirds of the items, while the Acute cases and the Normals are adequate on three-fourths.

On Part II the Acute group is the most inadequate, while the Deteriorated group is the most adequate.[14] The Deteriorated cases come within the range of adequacy of the Maladjusted and Borderline-Adjusted Patrol, but are below the range of the Well-Adjusted Patrol.[15]

(b) The Concept Span. Loose sortings tend to occur mainly in the Acute and Chronic cases, and seldom in the Deteriorated cases. Here the Deteriorated Paranoids again differ from the Deteriorated Unclassified Schizophrenics, in being not only much more adequate on both parts of the test but in showing also an absence of loose sortings. However, as with the Unclassified Schizophrenics, there appears to be a progressive increase in the incidence of extremely narrow sortings with increasing deterioration.

(c) The Conceptual Level. On Part I the incidence of abstract-conceptual responses is low for all three groups; the Chronic and Deteriorated cases tend to be somewhat poorer than the Acute cases. The Acute cases are further characterized by a high incidence of concretistic and syncretistic definitions. This emphasis changes in the Chronic cases to a high incidence of concretistic and—more significantly—to *fabulated* definitions, exceeding even the amount in the Deteriorated Unclassified Schizophrenics. The presence of fabulated definitions in active sorting thus becomes indicative of Chronic Paranoid Schizophrenia. The emphasis shifts again in the Deteriorated group, where concretistic definitions are replaced by an appreciable number (25%) of failures. Actually, many of these failures represent a concrete attitude which has been carried to its extreme, and thus prevents any sorting whatsoever. On Part II the Chronic and Deteriorated groups are superior to the Acute group in frequency of abstract-conceptual definitions. In the Acute group, syncretistic and concretistic definitions predominate. In the Chronic group, fabulations are again the outstanding characteristic. In the Deteriorated group, there are rather more failures; symbolic and false definitions occur, but none of these is extreme, and the averages of this group show no outstanding trend. However, incidence of abstract-conceptual definitions is slightly lower than that of our Normals.

---

[14] We have only 3 cases of Deteriorated Paranoid Schizophrenics here; however, this finding is congruent with several other findings concerning Deteriorated Paranoid Schizophrenics. On the Bellevue Scale they show a striking retention of efficiency in some areas of mental functioning.

[15] If any tentative norms are to be derived from this study, they should be based on the achievements of our Well-Adjusted Normals. It has consistently been our contention that concept formation is a poorly-developed and poorly-sustained function in individuals with a poor cultural background, and that precarious adjustment or maladjustment finds this area of thinking most vulnerable. Only in the well-adjusted "normals" with such a background can one hope for an adequate and efficient concept formation.

(d) Summary. A fair adequacy and conceptual level on Part I, with an impairment of these on Part II, is characteristic for the Acute Paranoid Schizophrenics; a reversal of this pattern is more characteristic for the Chronic and Deteriorated Paranoid Schizophrenics. In this respect they resemble the Chronic Unclassified Schizophrenics. Furthermore, in the Acute cases syncretistic, and in the Chronic cases fabulated, responses appear to be characteristic, while in the Deteriorated cases, failures—as in the Deteriorated Unclassified cases—are outstanding.

4. Simple Schizophrenics.

(a) Adequacy. The adequacy of active sorting in the Simple Schizophrenics shows signs of impairment, and one-third of the sortings are completely inadequate (minus). They do not, however, lag much behind the Patrol, either here or in their verbalizations.

(b) Concept Span. Loosening of the concept span in active sortings is not so frequent in the Simple Schizophrenics as in the other Schizophrenics. There tends to be a somewhat greater incidence of completely narrow responses than in the Acute Schizophrenics, which resembles that of the Chronic Schizophrenics. However, neither trend is outstanding.

(c) The Conceptual Level. On Part I the Simple Schizophrenics show a marked impairment of the abstract-conceptual level of definition; it is replaced by an outstanding number of functional and concretistic definitions and failures. On Part II the abstract-conceptual level shows less impairment, but is still lower than in the Normals. Failures here tend to be more frequent than in most clinical groups.

(d) Summary. The Simple Schizophrenics show some inadequacy of both active sorting and passive understanding; in the former they show a departure from the abstract-conceptual level to the functional and concrete levels.

5. The Paranoid Conditions.

(a) Adequacy. The adequacy of the Paranoid Conditions on both parts of the test is, in general, equivalent to that of the Patrol.

(b) The Concept Span. Loosening of the concept span is evident in some cases, although none becomes outstandingly loose. The same finding is true for extreme narrowing.

(c) The Conceptual Level. No outstanding trend distinguishing this group from the Normals has been observed by us.

(d) Summary. Within the framework of our scoring system, no features differentiating the Paranoid Conditions from our Normals have been observed.

6. The Preschizophrenics.

(a) Adequacy. On Part I the adequacy of the Coarctated group is close to that of the Patrol; the Over-Ideational group, because of its many *loose* sortings, lags somewhat behind. On Part II this difference no longer obtains, and both groups are about the same as the Normals.

(b) The Concept Span. Although loosening of the concept span is apparent in the Coarctated Preschizophrenics, and may even become considerable in extent (see Case No. 5), it is throughout the Over-Ideational group that loose concepts are outstanding. Extreme narrowing of the concept basis is rare in these groups.

(c) The Conceptual Level. No sharp differentiation of the Preschizophrenics from the Normals is here evident.

(d) Summary. It is essentially the loosening of self-created concepts which is characteristic for the Preschizophrenics, without special impairment in any other area. Although full-blown Schizophrenics have loose sortings also, they tend to have disturbances in other aspects of concept formation as well. Only from the Acute Unclassified Schizophrenics and the Schizoid Patrol is the differentiation difficult to make on this test.

7. The Depressives.[16]

(a) Adequacy. The Depressive Psychotics in average have an adequacy of active sorting (Part I) as good as that of the Patrol, while the Depressive Neurotics show some impairment. In adequacy of compliant concept formation (Part II), the reverse is the case, although both groups show some impairment. Both average 40% of inadequate verbalizations on Part II.

(b) The Concept Span. Loose sortings occur only in the Depressive Neurotics, chiefly in cases showing marked schizoid trends. In other words, a Depressive Neurosis, with its constricting effect upon ideation, need not necessarily inhibit schizoid tendencies toward loose concepts; thus the presence of loose sortings does not necessarily contra-indicate a depression. Characteristic for the Depressives, however, is an extreme narrowing of the concept span. Only in the *schizoid* depressions is the narrowing likely to be absent; otherwise, from 2 to 7 completely narrow sortings may occur, with additional mildly narrow groupings. Such narrowings are more likely to occur in the Depressive Neuroses than in the Psychoses, though in this respect both groups run high. Extreme narrowings occur in many other types of patients without obvious depressive symptoms, but when an extreme narrowing occurs on one of the easy items on Part I—such as the *fork*—depressive inhibition and inertia are indicated.

---

[16] Because of their small number of cases and similar trends, the Psychotic and Involutional Depressives were combined, and the Neurotic and Severe Neurotic Depressive groups were combined. We shall discuss only these two gross groups.

(c) The Conceptual Level. The incidence of abstract-conceptual definitions on Part I is extremely low in both the Depressive Psychotics and the Depressive Neurotics; we find in these groups an increase of functional definitions, concretistic definitions, and failures. On Part II there is also a great impairment of the abstract-conceptual level in both groups; it is more severe in the Psychotic group, where the abstract definitions are replaced partly by split-narrow definitions and failures—also expressions of the narrowed concept span of Depressives. In the Depressive Neurotics failures are also frequent, and—because of the schizoid individuals in these groups—the incidence of syncretistic definitions is somewhat high.

(d) Summary. The pattern of the Depressives thus appears to be inadequacy of active sorting and of compliant understanding, in which narrowness and departure from the abstract-conceptual level are predominant; the frequency of functional and concretistic definitions, as well as of failures, tends to be high.

8. The Neurotics. There are three separate trends in the Neurotics: the Hysterics and Obsessive-Compulsives tend to be quite efficient; the Anxiety and Depression group and the Neurasthenics tend to be inefficient, in a manner reminiscent of the Depressive Neuroses; and the Mixed Neurotics are anomalous in that some of their test features—for reasons not apparent to us—are surprisingly poor.

The Hysterics and Obsessive-Compulsives

(a) Adequacy. The Hysterics and Obsessive-Compulsives are the most adequate of all groups, clinical or control, in active sorting. 6 out of the 7 sortings on Part I are adequate or nearly adequate; the greatest difficulty is encountered on the *bell* item. On Part II these two Neurotic groups are as adequate as the Patrol.

(b) The Concept Span. The active sortings of these groups being in general adequate, they are neither too loose nor too narrow. An occasional looseness occurs, but only one case, an Hysteric, had two. Extreme narrowings are also rare. In an occasional Obsessive-Compulsive case there may be an accumulation of mild narrowing, as an expression of meticulousness and doubt.

(c) The Conceptual Level. As in adequacy, these two Neurotic groups are superior to the Patrol and the other clinical groups in the preservation of the abstract-conceptual level on Part I; on Part II they are as good as the Patrol.

(d) Summary. In terms of general test patterns, the Hysterics and Obsessive-Compulsives are indistinguishable from the most efficient Normals: their neurosis has not impaired their everyday concept formation, except insofar as the meticulousness of the Obsessive-Compulsives may become apparent.

The Anxiety and Depression Group and the Neurasthenics

(a) Adequacy. Adequacy of active sorting on Part I in these groups is about the same as that of the Patrol. On Part II the Neurasthenics suffer a marked impairment of adequacy, failing in average almost half the items. Thus the Neurasthenics are even more inadequate on Part II than the Depressive Neurotics, and are as poor as the Depressive Psychotics. The Anxiety and Depression group on the other hand remains adequate in compliant concept formation.

(b) The Concept Span. Loose sortings do not occur in the Neurasthenics, but depressive-like narrow sortings are characteristic. In the Anxiety and Depression group, depressive-like narrowness is again the outstanding feature, although loosenesses may occur.[17] Thus both the Anxiety and Depression group and the Neurasthenics follow essentially the depressive trend, by having a great incidence of narrow sortings.

(c) The Conceptual Level. Like the Depressives, the Anxiety and Depression group and the Neurasthenics drop greatly from the abstract-conceptual level on Part I: they are as low in average as the Depressive groups, and are exceeded only by the Simple, Chronic and Deteriorated Schizophrenics. For the Neurasthenics this is merely another evidence of their general inadequacy on all tests; but for the Anxiety and Depression group it is diagnostically more significant, since it appears on the Bellevue Scale that the organization of their thinking remains relatively intact. This was true even of their verbal concepts, as tested by the Similarities subtest. This then represents an important diagnostic pattern for this group: a good preservation of verbal intelligence—including verbal concept formation—associated with an impairment of active everyday concept formation. On Part II the Anxiety and Depression group regains its stride; although not on so high an abstract-conceptual level as the more efficient Neurotics or the Patrol, it is nevertheless not far behind. We have stressed in the introduction to the Sorting Test that Part II, referring as it does to compliant concept formation, is close to verbal concept formation; in both cases the realm of the concept is given to the subject, and the content is to be determined. On the other hand, on Part I the patient is on his own, and the Depressive trends operate immediately to impair performance.

---

[17] It should be stressed that, in the absence of schizoid trends, loosenesses may occur as a result of intense anxiety and insecurity in the testing situation. Subjects may show excessive caution by including even remotely related objects with the sample, in the hope of achieving some type of adequacy; what they actually make are loose sortings. In schizoid individuals there is generally a much greater confidence and ease about loose sortings; and it is by careful observation of the patient, as well as by checking into his performance on the other tests, that the differentiation between the effects of anxiety and of schizoid thinking can be made.

The Neurasthenic group remains poor on Part II, and again is on the low level of the Depressive Psychotics in the incidence of abstract-conceptual definitions. The incidence of failures is high in this group; it exceeds all other groups, and applies in average to nearly one-fourth of their responses. On Part II, if the Anxiety and Depression cases do not give good abstract definitions, they will as a rule give no definitions, and have failures.

(d) The Anxiety and Depression group follows the Depressive pattern by having on Part I a tendency toward a narrow concept span, a departure from the abstract-conceptual level, and a high incidence of failures; on Part II it is only by a somewhat high incidence of failures that they express this trend. Thus, they may be differentiated from the true Depressions, in which both parts are equally impaired. The Neurasthenics follow the Depressive pattern on both parts of the test: they are characterized by a narrowing of the concept span, a departure from the abstract-conceptual level, and an extreme tendency toward failures on Part II. The Neurasthenics, although as bad as the Depressive Psychotics on the Sorting Test, can be easily distinguished by other tests.

The Mixed Neurotics

In our study this was a small group which did not follow in all respects the trends of either of the two Neurotic divisions discussed above. They show impairment of adequacy of active sorting, and some inadequacy of compliant concept formation; in this respect they fall between the efficient Neurotic groups and the Neurasthenics. In concept span they tend to follow the pattern set by the Hysterics and Obsessive-Compulsives, being neither excessively narrow nor loose. As regards their conceptual level, there is a marked increase of concretistic definitions. On Part II, there is only a slight impairment of the abstract-conceptual level; but there tends to be a high incidence of syncretistic definitions.

Thus, Mixed Neurotics appear to show a tendency on Part I to be inadequate, and to resort to concretistic definitions; on Part II they are only slightly inadequate, and tend to resort to syncretistic definitions.

CHAPTER IV

THE HANFMANN-KASANIN TEST

A. INTRODUCTION

The test[1] consists of 22 blocks in five different colors, six different shapes, two different heights, and two different widths. The problem for the subject is to discover how these 22 blocks can be divided into four kinds. The solution is the division into tall and low, and wide and narrow, blocks; this results in tall-wide, tall-narrow, low-wide, and low-narrow groups.

The test instructions are the following: "Here are 22 blocks; however, there are only four different kinds. I want you to find out what these kinds are. In order to show me what you find out, I want you to put all blocks of the same kind into one corner. We have written on the bottom of each block a number like this (the examiner shows a sample block, usually the triangle with the number 1). The numbers that occur on the bottoms of the blocks are 1, 2, 3, and 4. When you find the right solution I will turn up all the blocks to show you that all the blocks which are of the *same* kind have the *same* number on the bottom; blocks of different kinds have different numbers on them. People do not usually start with the right solution. When you make a tentative solution, I won't turn up all the blocks because that would give it away; I shall turn up only one block in the group into which you place this sample. The differing numbers will show you that you do not yet have the right solution, and will also give you a clue how to proceed."

This test explores concept formation in a setting of problem-solving. It differs from the other two tests of concept formation, because here neither a content whose realm is to be discovered, nor an isolated realm whose content is to be discovered, is given; but rather a set of "things" which are to be divided into four realms, according to conceptual contents to be discovered. In other words, both content and realm are unknown, and only the number of realms to be created is given. The test accordingly differs from the other concept formation tests, in that neither verbal stereotypes nor everyday acquaintance with the objects aids the subject in solving it; and thus the freedom and sharpness of the independent creative concept-formation of the subject is directly tested. For this reason we often refer to the test as one of *basic concept formation*. This term may be misleading. It is not basic genetically, in the sense of tapping the original potentialities for concept formation; but rather in the sense that the top acuity of concept formation of the subject is reflected in it, unclouded and undisguised by verbal convention in the form of generic terms referring to content of concepts, or by everyday familiarity with the object-realms.

---

[1] Hanfmann and Kasanin (13).

For this very reason, the test performance depends as much on cultural background and natural endowment as on the adjustment. A subject coming from a background in which abstract thinking and concepts play little rôle, may be easily at a loss in this problem-situation; it is an unstructured situation for him. One may expect in such subjects a rather direct expression of personality trends in the course of performance especially when initial difficulties become strong. Therefore clear-cut diagnostic differentiation, by means of behavior or thought patterns, or by means of the sequence of attempts at solution, is not feasible. For this reason, and for others to be discussed, we found our material on this test not amenable to statistical analysis. Our treatment will emphasize the mode of administration of the test, and the characterological and thought-organization implications of various features of performance.

B. THE PSYCHOLOGICAL RATIONALE OF THE HANFMANN-KASANIN TEST

1. General Considerations. Problem-solving has been usually dealt with in terms of a psychology which approached thinking more as a *logical* than as a *psychological process.* In this framework, emphasis was put mainly upon the rôle of inductions and deductions in the steps toward the solution. It is of course true, from a formal point of view, that in the process of eliminating possibilities, drawing inferences from clues, and gradually arriving at the correct solution, inductions and deductions are constantly interacting in the sense described previously for active concept formation on the Sorting Test. From a psychological point of view, however, what is most significant is the subject's psychological experience in the course of solution, which may impede, disorganize or facilitate the interplay of deductions and inductions, and hence the progress toward the solution. His reaction to difficulty, to failure, to partial success, and to assistance is spotlighted. Thus an intimate relation between thinking and personality characteristics comes to expression in the course of the test. The psychological significance of this intimate relationship prompted us to use the test, and shaped our manner of administering and interpreting it.

We are not concerned with direct behavioral manifestations of frustration which become apparent as the test proceeds. Degree of behavior-control, and manifestations in expressive movements and tone of voice of anger, distress, and "being on the spot", have been described in detail in previous literature, and we shall not attempt to duplicate these. What is of consequence for our discussion is the impact of these emotional responses to frustration or failure on the orderliness, coherence, sharpness, and flexibility of the subject's thinking.

Essentially the Hanfmann-Kasanin Test experience consists in attempting to solve a conceptual problem with the assistance of instructions and clues, and in making tentative attempts at solution in a sequence leading to the correct solution. These tentative attempts—when shown by means of a new clue to be not the correct solution—may be experienced as any degree of success or failure by different subjects. From the subject's behavior, verbalization and conceptual performance in the course of the test, and from his understanding of, and reaction to, the instructions and the clues, we may infer the relation of his thinking and concept formation to his personality organization, and especially to that aspect of it which is concerned with reaction to success, failure, difficulty, and so on. In our experience, those aspects of thinking which are most directly observed in the course of performance, and which are intimately bound up with reactions to success and failure, are "flexibility", "fluidity", "persistence", and "rigidity". Thus our concern is with the encroachment upon the interplay of inductions and deductions by any or several of these factors.

2. Flexibility, Fluidity, Persistence, and Rigidity in the Course of Performance. *Fluidity* refers to a lability of concepts, lack of firmness or clear delineation of them, inability to carry them through to completion, or to retain and integrate them with new ideas. In everyday life such fluidity is evidenced when each new event or change of affairs finds no frame of reference into which to be integrated, and the individual is all at sea and clutching at straws; this, for instance, is the case with persons who change their plans, decisions, and actions every time they hear a divergent opinion. In the course of a single attempt on the test, fluidity may be evidenced by being overwhelmed by the many attributes of the blocks, with a consequent inability to stick to an idea once conceived, and constant shifting from one concept to another. Fluidity may be evidenced by a complete rejection of a division (concept) once attempted, upon being shown by a clue that the attempt was not the fully correct one; and by then "starting from scratch" with each new clue, without referring back to previous attempts as guiding posts. It may also be evidenced by attempting to put "one of each kind" in each group, or by grouping several sub-kinds together with a far-fetched rationalization.

Flexibility refers to the ability to modify concepts once developed, upon encountering difficulty or failure; to the capacity for delaying decision until sufficient relevant data is known; to a freedom of shifting from one concept to another, without complete rejection of any idea once conceived; to the ability to work with more than one concept simultaneously, without —as in the case of fluidity—confounding them and becoming disorganized and directionless; to the freedom of considering sometimes grosser, sometimes finer discriminations among the blocks, without losing a readiness to modify or abandon them when proved wrong by a clue or comment of the examiner's. In everyday life, flexibility allows for meeting new situations with appropriate measures which imply the possibility of success.

Rigidity refers to the inability to discard an idea once conceived, so that it permeates or obstructs all consequent attempts; to a resistance to apperceive the implications of clues for modification or discarding of concepts; to an unyielding attempt to squeeze the 22 blocks into a conceptual framework once conceived, even at the expense of loss of time, considerable arbitrariness, and even in the face of inevitable failure. Such a trend in everyday life will lead to consequences similar to those described for the test: for example, sticking to a job without satisfaction or hope of advancement, and even in spite of the possibility of losing it.

Persistence refers to the ability to retain for possible use all concepts once formed, without necessarily trying to stick to any one of these; to seeking the "good" in each attempt, with a consequent effort to integrate that "good" into the next attempt; to a firm grip on the outstanding gross attributes of the blocks, without being driven by unsuccessful attempts to minute differences, far-fetched connections, or abandonment of "kind" for "one of each kind"; to exploring implications of ideas once conceived in the light of new ideas, and keeping ideas already explored in abeyance rather than discarding them fully. While flexibility makes for successful meeting of new situations in everyday life, persistence makes for continuity and utilization of assets and investments of the past.

Actually a performance characterized exclusively by one of these modes is rare. Extreme rigidity occurs in isolated form in very compulsive and/or depressed patients; extreme fluidity in isolated form occurs in Schizophrenics, and more extremely with greater deterioration. In general, however, more than one mode will characterize a performance; and one extreme is usually a consequence of, or implied in, the other. Thus, a rigid clinging to an idea once conceived may, if a four-fold division is not achieved by means of it, necessitate a supplementary fluid marshalling of the blocks to effect it. Such an instance is seen when, after an initial attempt, the subject is given a clue and does not use it to recast his grouping, but rather attempts to dispose of it by placing it in one of his other groups with some poor rationalization. The rigid adherence to the principle once conceived is implied in the failure to realize that the clue proves his principle to be incorrect; consequently an extreme fluidity follows in an essentially planless or "concept-less" attempt to move the new clue alone elsewhere. A converse example would be the initial occurrence of fluidity, as in attempting to distribute one block of each kind into each corner; and then, in spite of all clues and hints from the examiner, clinging to this idea to the exclusion of all others, and attempting to integrate all new findings into it. *The optimal condition for successful performance is the presence of flexibility and persistence, to the exclusion of rigidity and fluidity.*

All these characteristics of performance have implications for the everyday thinking of the subject; his mode of facing new problems, his attack upon these, and its modification consequent on difficulty or failure, are reflections of the rigidity or fluidity of his thinking. "Stubbornness" in an argument, without consideration for the "good" in the opponent's ideas or data, is a reflection of rigidity. A lack of frame of reference, a constant vacillation between one idea and another, easy agreement with any point of view expressed, are reflections of great fluidity. Thoroughness, following an idea through to its consequences, "suspended judgment", attempts at integrating new ideas within the framework set by old ones, rather than vacillation between new and old ideas, are reflections of flexibility and persistence.

Let us turn back to the rôle of inductions and deductions, and trace their fate in the course of performance. The conceptual process is in many ways similar to that described in the Sorting Test. The subject observes certain differences between blocks, he generalizes these differences by setting up hypothetical principles (contents) of a division (realm), and turns then to the deductive job of subsuming all the blocks under each of the four divisions. The likelihood is that the principles conceived will not fully take care of the 22 blocks. He then has the choice of discarding them and looking for a more satisfactory hypothesis, or of clinging to the original hypothesis and forcing the 22 blocks in some way into its framework. This will be the first difficulty encountered in the reasoning process, and here essential characteristics of a subject's performance already become noticeable. If a subject attempts a division by height, and finds two heights only, he may discard the principle or he may cling to it. If he clings to it very rigidly, he may attempt to find tiny differences in height making for a fourfold division; or, less rigidly, he may be forced toward some fluidity in combining the height differences with differences in form or color. On the other hand, to discard the height principle *without once returning to it* is also a sign of great rigidity, demonstrating an unalterable reaction to and conclusion from the experience. The solution is reached with optimal speed and procedure when persistence rather than rigidity, and flexibility rather than fluidity, are present. Under optimal conditions, the subject who has already seen that color and form do not work, and who has hit upon the height idea, will persist with it though it yields only a bi-division; but he will not become so rigid as to search for tiny height differences. Instead he will be flexible enough to seek a second bi-division which can be combined with the first; he will reject the arbitrary and infinite possibilities of combining form or color with height, and thus may come to the two passable bi-divisions—angular-circular, or wide-narrow. This good balance between fluidity and rigidity is clearly bound up with the working methods of a personality in action, with its security and insecurity in handling ill-success by either abandoning the tools (principles) used, or by insisting on their efficacy.

Rigidity and fluidity become even more apparent in a subject's reactions to clues. Sometimes a clue appears to be a catastrophe which knocks the props out from under the subject's ideas, and leaves him in a state of extreme fluidity, doubt, and planlessness; here the rigid dependence upon the initial concept comes to striking expression. Fluidity is at play whenever the subject's frame of reference for his division is so blurred that each clue raises only the problem of disposing of the clue alone, and the subject fails to perceive its implied demand for a change of concept. This is especially clear where "one of each kind in each group" is the guiding idea; the essential planlessness of the attempt is revealed by the random and arbitrary shifting of clues only. In other words, the subject has conceived no principle upon which the clue can have an impact.

The administration of the test is thus, in a sense, regulated by the intentions of the examiner: (a) in the case of a rigid thinker, to attack the rigidity by giving clues that are likely to break it down; (b) in the case of a fluid thinker, to erect dams to curb the fluidity and force the subject to set up a system which further clues will influence.

It is further significant at which point in the performance rigidity or fluidity makes a prominent appearance. Many normals who have run through the concepts of form, color, height alone, and width alone, find themselves at a loss for a new concept; and only then become either rigid, by returning to a concept previously contradicted by a clue, or fluid by attempting arbitrary divisions. The sooner extreme rigidity or extreme fluidity enters the performance—that is, the less the obvious possibilities have been explored—the more pervadingly characteristic is either for the thinking and concept formation of the subject. Also, the greater the resistance to the implications of clues within the rigid framework, and the greater the disregard for these implications in the fluid framework, the more significant these become. In normal subjects such as our control group, whose background is at odds with the level of thinking implied in the test, too great rigidity or fluidity may appear early by reason of the "strangeness" of the task; or, in other words, because these subjects have a relatively vague frame of reference *for the test itself*. It is an unstructured situation for them, and their personality characteristics will be more readily expressed through their efforts in the test situation.

3. The Attempts at Solution. We shall first enumerate the attempts most usually seen, and to which thus no special significance should be attached; their significance derives only from the subject's persistence or lack of persistence in dealing with them in the course of performance. Second, we shall describe attempts at solution which are more or less unusual, and in themselves point to inadequacy of concept formation on the level implied in the test. Third, we shall discuss special features of performance which are in themselves indicators of severe pathology.

The usual and acceptable attempts at solution are:

(a) Form-solutions:
  (1) triangles; squares; circles; and all the rest as a mixed group;
  (2) triangles plus trapezoids; squares; circles and semi-circles; hexagons ("complete and incomplete forms of the same kind");
  (3) triangles; trapezoids plus squares; circles and semi-circles; hexagons ("number of sides");
  (4) triangles; trapezoids; squares; circles plus semi-circles plus hexagons ("the latter are all roundish").
(b) Color solutions:
  (1) red; yellow; white; green plus blue ("green and blue similar");
  (2) red; green; blue; yellow; and white with any group ("white is not a real color");
  (3) red; green; blue; yellow; and one white in each of the four groups ("I don't know where to put them; I will try this").
(c) Height solutions:
  (1) high-low; angular-circular;
  (2) height-form combined (somewhat arbitrary);
  (3) height-color combined (somewhat arbitrary).
(d) Width solutions, which follow the same patterns as the height solutions.
(e) General size solutions:
  (1) correct, but failing to recognize the height-width principle;
  (2) incorrect, in terms of width and height;
  (3) volume;
  (4) weight.

The unusual attempts at solution are:

(a) Form solutions:
  (1) all solutions which count (and usually miscount) the sides, edges or corners of the blocks: here arbitrariness is usually great, and inquiry is necessary because it often reveals peculiar, queer, or outright delusional ideas about the connections between blocks;
  (2) all solutions which rank blocks together because they can be assembled from each other (e.g., hexagons from triangles);
  (3) all solutions which attempt to distribute one of each form or "kind" into each group.

- (b) Color solutions:
  - (1) all solutions which attempt to place one block of each color or "kind" into each group;
  - (2) all solutions which attempt to put together each group or "kind" out of blocks of different colors and different forms simultaneously;
  - (3) all solutions which combine colors in an arbitrary way, *without* the implication, "I don't see anything else to do and I may get another clue this way".
- (c) Height solutions, where the two major height divisions are subdivided in terms of minute differences in height due to inaccurate cutting of the blocks.
- (d) Width solutions, where in addition to the two obvious width differences, further and arbitrary width differences are set up.
- (e) Weight and volume solutions:
  - (1) all solutions based on the subject's *weighing in his hands* the blocks;
  - (2) all solutions based on the subject's attempts to calculate *geometrically* the volume of the blocks.
- (f) Construction solutions, where the subject infers that his task is to "build" something with the blocks.

Any of these unusual solutions may occur in normal subjects as well, if they are weak in their concept formation or if they are producing solutions only to obtain further clues from the examiner. However, clinging to any of these ideas or their arbitrary variations reveals rigidity; fluidity is revealed by the *distribution* procedures, wherein any block of a certain color or form is interchangeable with any other block of the same color or form placed in another group.

Search for minute differences and attempts at "distribution" deviate from the spirit of the test and the test instructions. The former indicates that the subject is unaware that he is not expected to make differentiations which only a micrometer could make; the latter indicates that the idea of "the four kinds" to be discovered is lost sight of and, instead of similar objects, dissimilar ones are placed together. This resembles the procedure in Similarities when differences are stated, instead of likenesses, by subjects on a concrete level of concept formation.

In general, great rigidity refers to compulsive, inhibited, or retarded and/or blocked conceptualization; fluidity refers to primitive, impulsive, anxious but uninhibited, or quite disorganized conceptualization.

Let us turn now to special features of performance which in themselves are indicators of pathology. These may refer to (a) the manner of understanding the instructions, (b) the reaction to the clues, (c) general verbalizations, and (d) attempts at solution.

(a) Misunderstanding of the instructions or of the nature of the task.

  (1) Any doubt that there is a solution, when, beyond a suspicious attitude, the task is considered unsolvable or mere guesswork. It is necessary that this reaction be distinguished from a feeling of inadequacy.

  (2) Any forgetting of the problem, coming to expression in such questions as, "What do you want me to do?"; the expectation that all blocks will be turned upside down after the first attempt; the idea that one is free to turn up blocks to help oneself; statements such as, "You told me to put 4 blocks into each corner—these are left over", or "Why did I put these together? . . . I don't know."

  (3) Any uncertainty shown as to the essence of conceptualization, when it is verbalized as, "Color is not a kind", or "I have to think about the word *kind*, I don't know the definition." However, the question often asked by over-meticulous or over-cautious people, "Just what do you mean by *kind?*" does not belong in the pathological range here.

(b) Reaction to the clues.

  (1) The subject's disregard for the clues, grouping together clues bearing different numbers, and insistence upon doing so even after his attention is called to it. Normal subjects will "disregard" clues occasionally; but they will blame it on "not noticing" or "oversight", and will correct immediately.

  (2) The subject's failure to understand the conceptual significance of a new clue, and changing not his grouping but the position of that clue.

  (3) The subject's complete failure to recognize the conceptual nature of the task, stating that the clues are different "because they have different numbers on them". This too may be stated by normals, but only with a setting-in of a feeling of desperation after considerable and prolonged difficulty; and they will quickly abandon this idea.

(c) General verbalization.

The subject may use language or express ideas which in themselves are psychotic or schizophrenic. These will be easily spotted without reference to the test situation. However, a statement of a chronic schizophrenic, "I am lazy; just as soon let someone else work it", derives its pathological significance from the test situation in which it occurred; under other conditions it would pass unnoticed. Similarly with the statement of another chronic schizophrenic, who had earlier refused all help: "As a changing attitude, I am ready to accept assistance: there is a tendency to assist each other when life becomes too complex"; or "It is not good [the solution]—as a lot of things in life"; or "I'll turn back to my early first choices . . . on the theory that your first choice is sometimes better than your undecided opinion."

The examiner on the lookout for verbalization as a clue to the patient's thinking will not be concerned chiefly with the obvious schizophrenic verbalizations, but rather with those which could be said by anyone in an everyday situation, but which are unique in the test situation. References of the subject linking the performance to personal association or to extraneous factors, even to the test-board and its markings, belong here.

(d) Attempts at solution.

The attempts at solution which indicate a disorganization of the conceptual frame of reference are exemplified by the following:

(1) The subject inquires about, or attempts to form, patterns out of the blocks; unlike normal subjects, with whom this may occur after considerable failure and strain, the pathologically impaired subject does this early in the test, in a specific form, and perseverates with it. ("Should I put them one on top of the other?"; "This makes a fireplace.")

(2) The subject investigates very carefully the surface texture of the blocks, and attempts a division based on that.

(3) The subject attempts division in terms of hypothetical hard-soft wood, or other non-existing material differences.

(4) The subject attempts groupings in terms of which blocks could be cut out of identical types of basic material: "Triangles can be cut out of circles". Weak attempts like this sometimes occur in normals, but are quickly abandoned.

(5) The subject attempts division in terms of how many corners show if one block is placed over another; or on which or how many sides it can or cannot stand.

(6) The subject places blocks in terms of affective evaluations. "I need a little red here", or "I want a triangle here", or "It is gruesome—it should be here."

(7) The subject places blocks according to a symbolic interpretation, similar to "fabulation" on the Sorting Test. "If these (one group) were humans they would have drunk wine; and these (another group) would not, that's why they grew big and strong"; or circles are put with semi-circles, trapezoids, and squares,

"because they are all parts of an arch, the cylinders represent columns of it, the trapezoid and semi-circles keys of it and squares stones of it".

(8) The grouping is based on pure symbolism. Yellow and red blocks are placed together because "yellow represents hate and red represents love, and opposites attract each other"; or of another group, "they all pertain to the idea of self-control".

(9) The grouping is based on far-fetched abstractions; although the grouping itself may not be absurd, it shows extremely loose concept formation. This is seen when the subject refers to all of the groups as "heavily movable objects", or to the weight-principle as "estimation of pull of gravity", or to width as "the geometrical estimate of the distance from the center".

(10) The grouping is based on the assumption that it is all random, and that there is no meaningful solution. This must be distinguished from attempts by some normals, who make *any* division in order to get another clue.

(11) Chain-solutions, where a group is built up by successively relating a series of blocks according to different attributes. "This is round, and this is round; but the latter is blue, and the next is blue", etc.

C. ADMINISTRATION

In their first publications (12) Hanfmann and Kasanin recommended giving clues only when an incorrect solution was reached by the subject. In their recent publication (13), they recommend giving clues every five minutes, as well as after every incorrect solution. Both types of administration place emphasis on a "time-clue score" obtained. Our method of administration places emphasis on the task of the examiner in combating the rigidity or fluidity of the subject; thus clues are given not only when the subject reaches an incorrect solution, but whenever the course of performance shows that he is deadlocked by his rigidity or fluidity. No regular time-intervals for giving clues are set; the "time-clue score" thus becomes an even cruder orienting datum than in Hanfmann and Kasanin's administration. Our aim is not to help the subject find the solution as rapidly as possible; we are interested rather in letting the subject go on until he reaches a new line of attack on the problem, or until his performance convinces us that by himself he will not get away from his rigid or over-fluid performance; only then do we give a clue. But we are not interested in letting the subject grow confused or irritated in the course of pursuing an attempt that is leading nowhere, and which he appears unable to abandon without help. Accordingly we give clues in such cases before a hopeless waste of time has occurred. This procedure in giving clues makes the test administration dependent upon the subjective insight of the examiner. Consequently the Hanfmann-Kasanin test in our practice proved to be useful as a qualitative test rather than as an objectively-scored, quantitative instrument.

We are interested not only in seeing the subject's attempts without interrupting them by help every five minutes, but also in having him verbalize the ideas underlying these attempts. These verbalizations help us to judge the point at which a clue is to be given. It is true that the records thus become less amenable to interpersonal comparisons; but the test administration becomes a psychological investigation ever contributing to the examiner's experience with and psychological understanding of thought processes.

After a clue is given, a subject may spontaneously verbalize either the idea suggested by it or the fact that it suggests no idea; but there are cases where no verbalization follows an action, and cases where there is passivity without verbalization. At these times the examiner will ask the subject, "What do you have on your mind now?", or "What do these clues suggest to you?" If these queries do not bring the desired information, the subject is to be asked, "You remember that these clues represent different kinds. Well, how do they differ?" These questions are of importance because they usually reveal whether the subject has lost awareness of the task. Different clues represent *different* kinds, and identical clues represent *identical* kinds, and the difference of *different* and the similarities of *identical* clues are to be established; thus, any search for the *similarities* of the former, and the *differences* of the latter, is to be considered a loss of awareness of the task, exceeding in significance that manifested in distributing one of each color or form into each group.

The final amendment to the verbalization is obtained by an inquiry at the end of the successful or failed performance. This inquiry endeavors to establish (1) in what the subject thinks his solution or failure consisted; (2) whether the subject considers that he has reached a solution, and whether he considers it satisfactory; (3) whether the test was judged fair or tricky; (4) whether the clues were judged helpful, confusing or irrelevant.

D. DIAGNOSTIC INDICATIONS

This test in our experience did not usually provide definite *diagnostic* indications similar to those of the Bellevue Scale, the Babcock Test, or the Sorting Test. But it consistently provided indications of personality characteristics; and in some cases these did contribute toward the diagnosis, inasmuch as they were characteristics of personality and thinking which, from clinical-psychiatric knowledge, we knew to be most likely present in one syndrome or another. Description of personality characteristics and mode of thought, however, is an important aim of any psychological test investigation; and it was chiefly in this connection that the Hanfmann-Kasanin test was of service to us. We shall discuss in the following some of the major indications used by us.

1. *Compulsive thinking* may be indicated:
   - (a) by refusal to make any attempt at a form or color solution, because either involves a four-fold division of five or six attributes. These attempts are made by most other subjects, however much doubt is associated with them, in order to eliminate them as possibilities by an empirical test, or at least to get clues. The compulsive subject usually does not allow himself this liberty.
   - (b) by much concern about tiny differences between blocks whether in height, width, or shading.
   - (c) by a resistance to, or actual rejection of, the correct solution because of the variability within each group, especially of width.
   - (d) by any attempts at careful measurement—by thumb, pencil, or eye—of the aspects of height, width, volume, and so on.
   - (e) by dissatisfaction with the solution, once achieved, because it "lacks consistency" or is "too loose".
2. *Depressive trends* may be indicated:
   - (a) by inertia or extreme slowness of thinking about, or moving of the blocks.
   - (b) by extreme rigidity, so that after the first idea is conceived, inertia sets in; the subject is confused by clues and cannot imagine what to do next.
   - (c) by much self-depreciation and early insistence upon inability to solve the test-problem. (This attitude may also be characteristic of personalities who do not have clinically significant depressive trends.)
   - (d) by long periods of passivity in which no speculation or progress occurs.
3. *Anxiety and Insecurity* may be indicated:
   - (a) by being overwhelmed by each new clue, and feeling that the attempt was a horrible failure, and that one must now "start from scratch" again;
   - (b) by the dissolution of any frame of reference following a contradicting of a solution by a clue, and distribution of *different kinds* of blocks into each corner; in other words, losing the goal of the task and discarding attempts at new concepts, in reaction to failure;

(c) by insecure movement of the blocks, so that many of them are "accidentally" turned over;

(d) by such verbalizations as, "Does anyone ever get this?" or "I am too stupid to get this".

4. *Disturbed equilibrium between inductive and deductive thinking* may be indicated by the following:

(a) Much passive speculation, with little or no manipulation of the blocks, reflecting an over-emphasis on *deductive* reasoning with a weakened *inductive* or empirical attitude. When this happens doubt is the most frequent disturbing influence; and attempts, if started, may never be carried through, but be rejected "logically" before a grouping is completed, even though the correct concepts were considered. In the course of active grouping, empirical inductive experiences are of great help in "sensing" homogeneity, and direct the subject toward completion; but without such groupings, and the forceful sensory impressions arising from them, doubt has a free ride and can disrupt any concept.

A subject may, for example, sit passively and say "It can't be size . . . there are too many different sizes". If all 22 blocks are clustered closely together, one must be struck by the apparent variety of sizes. However, a bi-division of height alone will tone down the impression of "too many"; and then width differences may be better perceived.

Thus over-emphasis on deduction, with no empirical testing, may impede the correct solution, and indicate the subject's characteristic mode of dealing with everyday problems: thought may be free and creative, but the carrying of it into action is blocked, doubt encroaches on the development of ideas, and productivity is hampered if not destroyed.

There are of course highly intelligent persons who on this test, by fine differentiation of impressions, percepts and ideas, and by establishing firm but not rigid boundaries between these, may be able to come to an essentially deductive solution efficiently. In some aspects of experience, however, the dominance of this "thinker" attitude may be inappropriate and not helpful, while an inclination to empirical testing and inductive observation would be of great benefit. Most conducive to productive thinking is a dynamic equilibrium between the inductive and deductive attitudes—or, in other words, between "thinking" and "doing".

We have seen on the Sorting Test that a dominant deductive attitude can result in too many essentially narrow groupings, when the preconceived idea is not modified by empirical reference to all the test objects; and a dominant inductive attitude can result in too many essentially *loose* groupings, when there is no guiding idea which helps keep the group within reasonable limits, but only a chain-like construction of a group guided or misguided by the many attributes of the test objects. On the Sorting Test, the progressive alteration of deductions by inductive checking against all the test objects makes for the most adequate groupings.

We see now that this is also true for the less-structured Hanfmann-Kasanin Test situation, where manipulation of the blocks, together with deductive formulation of conceptual possibilities, is the most advantageous procedure for solution. The sensory impressions of homogeneity or contrast are important guides to solution; these become most striking when the blocks are divided on the board in one way or another, or even when they are pushed aimlessly about in the expectation or hope that something will "click" in the form of contrast or similarity.

(b) Over-emphasis on inductive experience with a weakened deductive attitude, so that no attempts are made to organize impressions into generalizations which then become guides toward division. This is the reverse of (a), and may also impede solution. The everyday thinking of persons manifesting this test-behavior is likely to be concrete, practical, not given to speculation or pleasure in formal reasoning; and their ideas are likely to be built up by slow learning from experience. Thus, in the course of performance, each clue will be of great significance to them in arriving at the solution.

5. *Reaction to frustration, difficulty, and failure* may be observed throughout the performance, and especially in the reactions to clues which show that the attempt is not correct:
   - (a) aggression may be directed inward, in the form of self-depreciation and discouragement; or
   - (b) aggression may be directed outward, by stressing the difficulty of the problem and the lack of clarity of the instructions and of the word "kind"; by becoming suspicious, and suggesting or stoutly maintaining that the puzzle is unsolvable; or even by direct verbal expression of aggression toward the examiner.
   - (c) Difficulty or failure may result in the establishment of a rigid system of ideas, which will be impervious to all attempts to break it down by hints or clues; or

(d) may result in the abandonment of any attempt to proceed within a conceptual framework, and in a consequent fluidity, arbitrariness and planlessness; or

(e) may elicit queer patterns of thinking—usually diagnostic of schizophrenia—which otherwise might remain concealed. In this case the test becomes a crucial diagnostic tool; preschizophrenic conditions, or schizophrenias with an insidious, unspectacular onset, may be indicated by a sudden bizarre idea or attempt in this test. Thus Coarctated Preschizophrenic No. 10 reasoned as follows: "Mur[2] is *wall* in French; wall is either high or at right angles; if that is a clue it must have reference to height or right angles." This case also symbolized the cylindrical blocks as "pillars of an arch", the trapezoids and semi-circles as "keys of an arch", and the squares as "stones of an arch".

Thus the difficulty of the test puts the subject's thinking to task, and may elicit deep-lying and diagnostically significant features of his thought-organization; whereas in everyday life, where one treads on well-known ground, verbal convention and apparent meaning can well obscure, or prevent from coming to expression, such pathological trends in thinking. One must be careful, however, to distinguish the desperate attempts of a normal—which may involve far-fetched or arbitrary ideas—from essential queerness. Reference to other tests often is invaluable here.

The transition from behavior on this test to behavior in everyday life, when problems offering difficulty are encountered, is not difficult to make. The subject in the test situation is the same person working as a highway patrolman, heading a family, paying the bills, filling out income tax blanks, and so forth. As on all our tests, we assume a continuity of behavior and thinking extending beyond the testing-situation. The clinical diagnostician will use the Hanfmann-Kasanin test only if he wishes to obtain a very complete picture of the patient or subject, or if he is especially interested in the patient's mode of thinking and reaction to difficulty and frustration. The more general use of the test is limited by its dependence upon educational and cultural background. However, where leadership qualities are the subject-matter of investigation, and where the ability to meet new situations and make or suspend decisions is of central importance, the Hanfmann-Kasanin test should be one of the tests of choice in the hands of psychologically-trained and intuitive examiners.

---

[2] For a time the clues we used were not numbered, but labelled with the four nonsense syllables introduced by Hanfmann and Kasanin: *Mur*, *Bik*, *Lag*, *Cev*.

CHAPTER V

PATTERNS OF ACHIEVEMENT ON THE THREE CONCEPT FORMATION TESTS

This short chapter will be devoted to some relationships between the three concept formation tests treated.

We have seen in the Similarities section of the Bellevue Scale chapter that *verbal concepts* may in general remain intact in spite of profoundly disorganized thinking, but that they do tend to become impaired in certain of our clinical groups. We have also seen there that in certain of the "intellectualizing" groups, verbal concepts may be a significantly superior asset of the patient; and also that a poor cultural background in normals may leave verbal concepts poorly developed. When discussing the Sorting Test, we have shown how much more vulnerable to maladjustment, and even to special cultural factors in "normals", everyday concept formation is. Our discussion of the Hanfmann-Kasanin Test was concerned mainly with pointing up such qualities of *basic concept formation* as rigidity, fluidity, persistence, and flexibility. These different aspects of concept formation have been discussed for the most part separately, and it remains to consider the implications of certain kinds of performance and degrees of achievement on one test of concept formation in relation to performance and achievement on another.

Before turning to our pertinent results, two considerations must be stressed. (1) Inasmuch as we did not find the Hanfmann-Kasanin Test amenable to a statistical treatment which would still retain the "feel" of the records, we can only attempt to integrate qualitative indications drawn from this test into the more quantitative framework provided by the Similarities and Sorting Tests. (2) Partly because of lack of space, and partly because there are many potential starting-points for such an intercomparison of the three tests, we followed the analysis through with respect only to the achievement on Similarities. This is the starting-point we most frequently use in our everyday clinical thinking about the concept formation of individual patients.

In the following, we shall first present some statistical comparison between achievement on Similarities and the Sorting Test. Secondly, we shall indicate how integration of the findings concerning basic concept formation, and those concerning everyday and verbal concept formation, provides a more structured picture of the formal aspects of the patient's thinking.

A. RELATIONSHIPS BETWEEN VERBAL CONCEPTS AND SORTING BEHAVIOR

Let us first consider those subjects whose Similarities scores indicate impairment and/or a low level of verbal concept formation. We considered as *impairment* a weighted score on Similarities 3 or more units below the Vocabulary level; and as a *low level of verbal concept formation* any weighted score on Similarities less than 10. The datum of the Sorting Test used to indicate impairment was the number of signs present of the nine we described in the section on the Sorting Test (p. 450).

TABLE 110-A.—*Relation between Impaired Similarities and Impaired Sorting Test*

Group*	No. of Cases	Av. No. of Signs**
Total Population	205	1.7
Population, Impaired	44	2.9
Population, Non Impaired	161	1.4
(P + U) Sch, Impaired	16	4.3
(P + U) Sch, Non Impaired	25	1.9
[Population − (P + U) Sch], Impaired	28	2.1
[Population − (P + U) Sch], Non Impaired	136	1.3
Pr (C + O-I), Impaired	3	4.0
Pr (C + O-I), Non Impaired	20	1.7
Depr, Impaired	3	2.7
Depr, Non Impaired	17	1.8
(A & D + MN + Neuras), Impaired	2	3.0
(A & D + MN + Neuras), Non Impaired	17	1.8
(Hy + O-C), Impaired	5	2.0
(Hy + O-C), Non Impaired	22	.5
Patrol, Impaired	11	1.2
Patrol, Non Impaired	43	.9

* The group divisions were made on the basis of differences in similarities scores.

** These are the pathological signs on the Sorting Test, discussed on page 450.

Table 110-A presents the data of this comparison. It shows that the 44—out of our total of 205—cases with impaired or poor verbal concepts far exceed the rest of the population in their incidence of signs of impaired sorting behavior. The averages are 2.9 and 1.4.

This result becomes more meaningful if we consider the trends in certain of our groups. We see that the difference within the Schizophrenic groups between the number of signs shown by cases with and without impaired Similarities is greater. (Averages: 4.3 and 1.9.) Table 110-B shows this difference between means to be significant. That this is the group largely responsible for the gross difference noted in the preceding paragraph is attested to by the fact that—as shown in Table 110-A—when the Schizophrenics are excluded, the differences for the population are significantly smaller. (Averages: 2.1 and 1.3.) Furthermore, among our Normals the difference is almost negligible: 1.2 to 1.0. Only the Preschizophrenics—and there only a few cases—show a trend of similar magnitude. Thus, the relationship between impairment on Similarities and on the Sorting Test appears to obtain essentially for schizophrenic disorders. A bi-serial correlation between their impairment or non-impairment on Similarities and their number of signs on the Sorting Test was significant, being equal to +.69 ± .12.

An impaired Similarities score, together with many signs of impairment on the Sorting Test, is thus most indicative of schizophrenia. If Similarities is poor—inadequate but not absurd—but the Sorting Test shows little or no impairment, the most likely possibility is that the subject is of poor cultural background and may well be "normal".[1]

TABLE 110-B.—*Significance of Difference in Averages*

Groups Compared	"t"	Significance
(P + U) Sch, Impaired : (P + U) Sch, Non Impaired	3.87	<1%
(P + U) Sch, Impaired : [Population − (P + U) Sch], Impaired	4.19	<1%
(P + U) Sch, Impaired : Patrol, Impaired	3.79	<1%

If we turn to an analysis of the relationship between excellent verbal concept formation—a Similarities score of 14 or more—and the number of signs on the Sorting Test, we see in Table 111-A that for our total population, good Similarities tends to accompany few signs on the Sorting Test: the averages are 1.2 and 2.0. If we turn to the data for the Schizophrenics, we see the difference again greatly extended and significant: 1.5 and 3.3. This trend is also true for the Preschizophrenics (1.6 and 2.5) and for the inefficient Neurotic groups (1.7 and 2.3), though not so striking as for the Schizophrenics. For the Normals this trend, though present, is still smaller (.6 and 1.1). Here again the closest relationship between the two types of concept formation obtains in the Schizophrenics.

---

[1] The reverse is sometimes the case also; the poor cultural background may retard either type of concept formation, and in rare cases, both.

So far, we have found that when schizophrenia impairs verbal concepts it will probably impair everyday concept formation as tapped in sorting behavior. On the other hand, if verbal concepts remain well-preserved in schizophrenia, the likelihood is that sorting behavior will not be too impaired.

TABLE 111-A.—*Relation between Excellent Similarities and Impaired Sorting Test*

Group*	No. of Cases	Av. No. of Signs**
Total Population	205	1.7
Population, Excellent	79	1.2
Population, Not Excellent	126	2.0
(P + U) Sch, Excellent	12	1.5
(P + U) Sch, Not Excellent	29	3.3
Pr (C + O-I), Excellent	13	1.6
Pr (C + O-I), Not Excellent	10	2.5
Depr, Excellent	5	2.2
Depr, Not Excellent	15	2.5
(A & D + MN + Neuras), Excellent	13	1.7
(A & D + MN + Neuras), Not Excellent	6	2.3
(Hy + O-C), Excellent	12	.2
(Hy + O-C), Not Excellent	15	1.3
Patrol, Excellent	14	.6
Patrol, Not Excellent	40	1.1

* See Footnote (*) to Table 110-A. ** See Footnote (**) Table 110-A.

TABLE 111-B.—*Significance of Difference in Averages*

Groups Compared	"t"	Significance
(P + U) Sch, Excellent : (P + U) Sch, Not Excellent	2.57	1%
(P + U) Sch, Excellent : Patrol Excellent	1.48	10–20%
Pr (C + O-I), Excellent : Patrol, Excellent	1.89	5–10%

The averages in Table 111-A have, however, a more crucial diagnostic implication. If we compare the averages for the Schizophrenics and Preschizophrenics having well-preserved Similarities and that of the group of Normals, we see that the former groups definitely exceed the Normals in the incidence of signs of impaired sorting behavior. The implication for

TABLE 112.—*Diagnostic Significance of Signs on Part I*

Groups*	No. of Cases	Average No. of Signs on Part I	Average No. of Signs on Part II	Average No. of Signs**
(P + U) Sch, Excellent	12	.7	.8	1.5
Pr (C + O-I), Excellent	13	1.1	.5	1.6

* See Footnote (*) to Table 110-A. ** See Footnote (**) to Table 110-A.

TABLE 113.—*Relation between Achievement on Similarities and Impairment on the Sorting Test*

Group*	No. of Cases	Average No. of Signs**
Total Population	205	1.7
Population, Excellent	79	1.2
Population, Impaired	44	2.9
Population, Fair	82	1.5
(P + U) Sch, Excellent	12	1.5
(P + U) Sch, Impaired	16	4.3
(P + U) Sch, Fair	13	2.0
Pr (C + O-I), Excellent	13	1.6
Pr (C + O-I), Impaired	3	4.0
Pr (C + O-I), Fair	7	1.9
Depr, Excellent	5	2.2
Depr, Impaired	3	2.7
Depr, Fair	12	2.5
(AD + MN + Neuras), Excellent	13	1.7
(AD + MN + Neuras), Impaired	2	3.0
(AD + MN + Neuras), Fair	4	2.0
(Hy + O-C), Excellent	12	.2
(Hy + O-C), Impaired	5	2.0
(Hy + O-C), Fair	10	1.0
Patrol, Excellent	14	.6
Patrol, Impaired	11	1.2
Patrol, Fair	29	1.1

* See Footnote (*) to Table 110-A. ** See Footnote (**) to Table 110-A.

diagnosis is that many a schizophrenic and preschizophrenic may have impaired concept formation concealed behind a good verbal front, but demonstrable by the Sorting Test. Table 112 contributes a further diagnostic bearing, indicating that Preschizophrenics with excellent retention of the verbal concepts are most likely to give themselves away on

Part I of the Sorting Test, where active everyday concept formation is required; this is not true for the Schizophrenics. Thus, the examiner who is considering the possible presence of a Preschizophrenia may go beyond a good Similarities achievement, and examine carefully the concept formation on Part I of the Sorting Test. As a rule, he should not be content with Similarities as a sufficient diagnostic test of concept formation, but should evaluate it only in connection with the Sorting Test.

Table 113 presents the average number of Sorting Test signs separately for the "excellent", "fair", and "impaired" subgroups; it shows the "fair" group to have an average constantly between that of the "excellent" and "impaired" groups. Although this intermediate average is sometimes more in one direction and sometimes more in the other, it supports the validity of the trend through all the groups to have some relationship between the two types of concept formation.

We conclude that there is a positive correlation between the levels of verbal and everyday concept formation in all our clinical and control groups; that in spite of this correlation, many Schizophrenics and Preschizophrenics may be detected by looking beyond their well-preserved level of verbal concept formation and examining carefully their everyday concept formation on the Sorting Test; that the Preschizophrenics are most likely to be spotted by impairment of *active* sorting, while the Schizophrenics are likely to be impaired on both parts of the Sorting Test.

B. THE PLACE OF THE HANFMANN-KASANIN RESULTS

Finally, let us consider how Hanfmann-Kasanin data may be integrated with those of verbal and everyday concept formation. This may be done best by examples.

A given subject may be excellent on Similarities and on the Sorting Test, but may manifest marked rigidity on the Hanfmann-Kasanin Test. One would infer from such a pattern that the subject's good concept formation capacity is hampered in meeting a new problem by a rigid clinging to concepts once evolved. When the problems are familiar in everyday life, or are purely verbal, he may demonstrate a good facility and clarity.

Another subject may be poor on Similarities, being dominated by a concrete attitude for verbal concepts; he may be similarly poor on the Sorting Test; and on the Hanfmann-Kasanin he may manifest marked fluidity. This is the picture of an individual rooted in the concrete, thinking without a general frame of reference—which always involves some abstract thinking in its construction—and only about details. Consequently, when faced with a new problem or a new turn of events, he has nothing to go by, is lost in a maze of impressions, and will be totally ineffectual.

A subject may do well on Similarities and on Part II of the Sorting Test, where compliant everyday concept formation is involved; at the same time, active everyday concept formation (Part I) and basic concept formation (Hanfmann-Kasanin) may be poor. This subject will be one with a ready understanding of the ideas (concepts) of others, but with little ability to create his own ideas and to modify them.

A subject may be excellent on Similarities; may be impaired on the Sorting Test, having loose sortings and fabulatory definitions; and on the Hanfmann-Kasanin Test may show extreme rigidity which involves much arbitrariness, some peculiarity, and a rejection of the possibility of solution. This case would most likely be one with paranoid features and with a well-retained formal verbal "front", behind which a psychosis may be concealed.

A subject may be fair on Similarities; may be fair on Part I and good on Part II of the Sorting Test; and may, after attempting a few solutions on the Hanfmann-Kasanin Test, become too rigid or fluid without evincing any peculiarity or queerness. This may well be a bright normal individual with a poor cultural background.

A subject may be impaired on Similarities, being unable to see likenesses; he may also be impaired on the Sorting Test, again because of failure or extreme narrowing of the concept span; and he may fail the Hanfmann-Kasanin because of inertia, slowness, rigidity, discouragement and self-depreciation. This may well be a Depressive Psychosis. If the Similarities score is unimpaired, it may be rather a Depressive Neurosis.

A subject may do well on Similarities; may show an extremely concrete attitude on the Sorting Test, so that no real concepts are developed; and may solve the Hanfmann-Kasanin Test quickly, but with a sudden emergence of a queer or symbolic idea, or a chain grouping, in the course of performance. This subject will most likely be a Chronic Schizophrenic with some retention of a "good front" on a conversational level, an underlying marked inadequacy of independent thinking about common everyday ideas, but an essentially good basic concept formation which is warped by psychotic ideas upon encountering difficulty.

A subject may show excellent verbal and compliant everyday concept formation; may have active everyday concept formation somewhat impaired by loosening of the concept span and the formation of syncretistic concepts; and may produce a peculiar rationalization of an attempted solution or of the significance of a clue on the Hanfmann-Kasanin Test. Such a pattern is frequent in Preschizophrenic conditions.

These are but a few of the many patterns one encounters in everyday clinical work, and are not even fully representative of any of the specific groups mentioned. Our attempt has been rather to demonstrate how we apply our frame of reference for diagnostic concept formation testing to individual cases, in order to gain a summary picture of organization and efficiency on different levels, and for different aspects, of concept formation

BIBLIOGRAPHY

1. Babcock, H. An experiment in the measurement of mental deterioration. *Arch. Physiol.* 117: 105 pp., 1930.
2. Babcock, H. *A short form of the Babcock examination for the measurement of mental deterioration.* 16 pp. Chicago, Stoelting, 1933.
3. Bolles, R. and Goldstein, K. A study of the impairment of abstract behavior in schizophrenic patients. *Psychiat. Quart.* 12: 42–65, 1938.
4. Buehler, K. *Die geistige Entwicklung des Kindes.* 484 pp. Jena, Fischer, 1929.
5. Buerger-Prinz, H. and Kaila, M. Ueber die Struktur des amnestischen Symptomenkomplexes. *Z. Neurol. Psychiat.* 124: 553–595, 1930.
6. Cassirer, E. *Philosophie der symbolischen Formen.* Vol. II. 320 pp. Berlin, Cassirer, 1925.
7. Escalona, S. The effect of success and failure upon the level of aspiration and behavior in manic-depressive psychoses. *Studies in Topological and Vector Psychology* 1: 199–302, Univ. Iowa P., 1940.
8. Frank, L. Time perspectives. *J. Soc. Phil.* 4: 293–312, 1939.
9. Freud, S. *The interpretation of dreams.* Pp. 179–548. In: *The basic writings of Sigmund Freud.* 1001 pp. Ed. Brill, A. A., New York, Modern Libr., 1938.
10. Freud, S. Formulations regarding the two principles in mental functioning. Pp. 13–21. In: *Collected Papers,* Vol. IV, 508 pp. London, Hogarth, 1925.
11. Goldstein, K. and Scheerer, M. Abstract and concrete behavior: an experimental study with special tests. *Psychol. Monogr.* 53: 151 pp., 1941.
12. Hanfmann, E. and Kasanin, J. A method for the study of concept formation. *J. Psychol.* 3: 521–540, 1937.
13. Hanfmann, E. and Kasanin, J. *Conceptual thinking in schizophrenia.* 115 pp. New York, Nerv. Ment. Dis. Monogr. 67, 1942.
14. Harris, A. and Shakow, D. The clinical significance of numerical measures of scatter on the Stanford-Binet. *Psychol. Bull.* 34: 134–150, 1937.
15. Hilgard, E. and Marquis, D. *Conditioning and learning.* 429 pp. New York, Appleton, 1940.
16. Katona, G. *Organizing and memorizing.* 318 pp. New York, Columbia Univ. P., 1940.
17. Koehler, W. *Gestalt psychology.* 403 pp. New York, Liveright, 1929.
18. Koffka, K. *Principles of gestalt psychology.* 720 pp. New York, Harcourt, 1935.
19. Lévy-Bruhl, L. *Primitive mentality.* 458 pp. Trans. Clare, L. A. London, 1923.
20. Long, L. and Welch, L. Factors affecting efficiency of inductive reasoning. *J. Exp. Educ.* 10: 252–264, 1942.
21. Piaget, J. *The child's conception of the world.* 397 pp. New York, Harcourt, 1929.
22. Rapaport, D. *Emotions and memory.* 282 pp. Baltimore, Williams and Wilkins, 1942.

23. RAPAPORT, D. Principles underlying projective techniques. *Character and Personality* 10: 214–219, 1942.

24. REICHARD, S., SCHNEIDER, M., AND RAPAPORT, D. The development of concept formation in children. *Amer. J. of Orthopsychiatry* 14: 156–161, 1944.

25. ROE, A. AND SHAKOW, D. Intelligence in mental disorders. *Annals of New York Acad. Sci.*, 1942, Vol. XLII, Art. 4, 361–490.

26. SELZ, O. I. *Ueber die Gesetze des geordneten Denkverlaufs.* 320 pp. Bonn, Cohen, 1913. II. *Zur Psychologie des produktiven Denkens. Eine experimentelle Untersuchung.* 688 pp. Bonn, Cohen, 1922.

27. STODDARD, G. *The meaning of intelligence.* 504 pp. New York, Macmillan, 1943.

28. WECHSLER, D. *The measurement of adult intelligence.* 248 pp. Baltimore, Williams & Wilkins, 1941.

29. WEIGL, E. On the psychology of so-called processes of abstraction. *J. Ab. Soc. Psychol.* 36: 3–33, 1941.

30. WELLMAN, B. Iowa studies on the effects of schooling. *The thirty-ninth yrbk. of the Nat. Soc. for the Study of Educ.* 409 pp. Bloomington, Ill., Public School Publ. Co., 1940.

31. WERNER, H. *Comparative psychology of mental development.* 510 pp. New York, Harper, 1940.

32. YACORZYNSKI, G. An evaluation of the postulates underlying the Babcock Deterioration Test. *Psych. Rev.* 48: 261–267, 1941.

APPENDICES

APPENDIX I

VITAL DATA OF OUR CLINICAL AND CONTROL POPULATION

Key to Abbreviations:

Smt.—small town (population less than 20,000)
Mt. —middle-sized town (population 20,000 to 100,000)
Bt. —big town (population 100,000 to 400,000)
Metr.—metropolis (population 400,000 or more)

M —married
D —divorced
W —widow or widower
Anu —annulled

A —adopted children
SC —stepchild

Husband's occupation listed under "Own Occupation" in parentheses

Case No.	Age	Sex	Yrs. Married	Children	Where Raised	Father's Occup.	Educ.	Own Occup.	Specific Symptomatology
Acute Unclassified Schizophrenia									
1	24	F	6	1	Kan. Smt.	Farmer	H.S. grad.	Housewife (civil engr.)	Periodic excitement, reference ideas, preoccupation, depressive trend, anxiety.
2	30	F	4	2	Kan. Smt., Kan. Mt.	Physician	Coll. grad.	Housewife, Stenographer (lawyer)	Confused, intensely deluded, reference ideas, overt homosexual advances, masturbatory preoccupation.
3	47	F	19	4	Kan. Smt., Mo. Metr.	Laborer	1 yr. H.S.	Housewife, Bookkeeper (mayor)	Hysteric-like onset, hypochondriacal delusions, anxiety.
4	25	F	M1 D3	—	Mo. Metr.	Salesman	H.S. grad.	Telephone opr., unemployed	Delusion of pregnancy, quarrelsomeness, irritability, anxiety.
5	28	F	6	2	Tex. ranch	Rancher	Coll. grad.	Housewife (rancher)	Self-accusatory delusions, depressive features, periods of excitement, confusion.
6	35	M	7	1	Kan. Smt.	Depot keeper	H.S. grad.	Linotype opr.	Depression, religious delusions, preoccupation with masturbatory guilt.
7	25	F	6	2	Mass. Metr.	Secy. of college	1 yr. coll.	Housewife (Lt., U.S.N.)	Episodic confusion, bizarre behavior, fugues, withdrawal.

Acute Unclassified Schizophrenia (*continued*)

Case No.	Age	Sex	Yrs. Married	Children	Where Raised	Father's Occup.	Educ.	Own Occup.	Specific Symptomatology
8	33	F	7	2	Okla. Bt.	?	Coll. grad.	Housewife, Teacher (salesman)	Mystical delusions, alternating excitement and depression, episodes of mutism.
9	28	F	—	—	Kan. Smt.	Bakery	Coll. grad.	Salesgirl, Clerk	Overt homosexuality, excitement and posturing.
10	16	F	—	—	Kan. farm	Farmer	2 yrs. H.S.	Student	Excitement, intense delusions to the point of confusion.
11	27	M	—	—	Kan. Mt.	College teacher	3 yrs. coll.	Student	Reference ideas, hallucinations, extreme anxiety, disorganization.
12	43	M	19	—	Kan. Mt.	Contractor	Coll. grad.	Partner in dairy	Delusions of religious nature and of influence, suspicious trends.
13	16	M	—	—	Colo. Mt., Kan. Mt.	Small manufacturer	H.S. student	Student	Alternation of blocking and excitement, grandiose and annihilation ideas, blocking at time of testing.
14	22	M	—	—	Kan. Mt.	Stockholder of newspaper	3 yrs. coll.	Student	Ideas of reference and influence, confusion, impulsive outbursts, blocking.
15	19	M	—	—	Wash. Bt., Conn. Mt., Calif. Metr.	Naval officer	1 yr. H.S., 1 yr. boarding school	Student	Ideas of reference, preoccupation with masturbation, conscious incestuous wishes, flattening of affect.
16	21	M	—	—	Kan. Mt.	Salesman	Business coll. student	Student	Overt homosexuality, "silliness", superficial front.
17	31	M	3	—	Kan. farm	Farmer	Coll. grad.	Newspaper field circulation supervisor	Grandiose, mystical delusions.
18	34	F	15	4	Ind. Bt.	Pathologist	2 yrs. coll.	Housewife (manages property)	Depression, conscious hostile impulses, impulsivity.

Case No.	Age	Sex	Yrs. Married	Children	Where Raised	Father's Occup.	Educ.	Own Occup.	Specific Symptomatology
Chronic Unclassified Schizophrenia									
1	30	F	—	—	N.J. Mt.	Bank examiner	H.S. incomplete	None	Urbane front, flattening of affect, ideas of reference, promiscuity, alternating excitement and depression.
2	36	M	—	—	Kan. Mt.	School principal, mgr. messenger service	Coll. grad.	Chemist	Alternating depression and excitement, hypochondriasis, periodic hallucinations and delusions.
3	17	F	—	—	Mo. Metr.	Merchant	H.S. student	Student	"Silliness," bizarreness
4	28	F	—	—	N. M. Mt.	Lawyer	Coll. grad.	Stenographer	Blocking, depressive trends, preoccupation with sexuality.
5	26	F	—	—	Neb. Smt.	Banker	Coll. grad.	Stenographer	Excitement, alternating elation and depression, thought disorganization.
6	20	M	—	—	Ill. Metr., Mo. Metr.	Engineer	1 yr. coll.	Student	Withdrawal, negativism, some ritualistic behavior, depressive trend, bodily preoccupation.
7	35	F	—	—	Iowa Bt.	Small banker	Coll. grad.	None	Overt homosexuality, elation - depression, variation from unmanageable to socially acceptable behavior.
8	25	F	—	—	Pa. Smt.	Architect	2 yrs. coll.	None	Flat affect, superficial urbanity, thought disorganization.
9	37	F	19	3	Tex. Bt., Fla. Bt., Okla. Bt.	Army officer	Attended coll.	Housewife	Disorganized widespread delusions, some paranoid trends.
10	26	M	—	—	N. Y. Metr.	Broker	Coll. grad.	Engineering Officer, U. S. N. (discharged)	Blandness, fetishism, preoccupation with masturbation, suicidal attempt.
11	27	F	7	2	Minn. Metr.	Baker	H.S. grad.	Housewife (army)	Flatness of affect, promiscuity.
12	15	M	—	—	Ill. Metr.	Accountant	H.S. stud.	Student	Negativism, paranoid trend, mannerisms.

Case No.	Age	Sex	Yrs. Married	Children	Where Raised	Father's Occup.	Educ.	Own Occup.	Specific Symptomatology
Chronic Unclassified Schizophrenia (*continued*)									
13	20	M	—	—	La. Smt.	Farmer	Coll. stud.	Student	Negativism, paranoid trend.
14	26	F	M6 D2	1	Kan. Mt.	Coll. prof.	Coll. grad.	Soda fountain clerk	Extramural existence despite psychopathic-like, promiscuous behavior and obvious disorganization of thought and affect.
Deteriorated Unclassified Schizophrenia									
1	47	F	30	3	Mass. Mt.	Manufacturing co. secretary	Coll. grad.	Teacher (architect)	Superficial politeness some depressive front, disorganization of thought and behavior.
2	33	F	—	—	N. Y. Metr.	Physician	1 yr. coll.	Model	Incoherence, infrequent aggressive outbursts.
3	27	F	—	—	Ind. Smt.	Farmer	H.S. grad.	None	"Silliness", bizarreness, episodes of aggression.
4	39	F	—	—	N. Y. Metr.	Manufacturer	Coll. grad.	None	Thin urbane front, blocking, negativism, disorganization of thought, flat affect.
5	25	M	—	—	Spain	Exporter	2 yrs. coll.	None	Disorganized, bizarre all-pervading delusions.
6	55	F	31	1	Ind. Smt.	?	H.S. grad.	Housewife, (Clerk)	Incoherence, bizarre behavior, initial delusions of infidelity now barely noted.
7	25	F	—	—	Colo. Metr.	Owner of laundry	Coll. grad.	Laboratory technician	Disorganized bizarre delusions of sexual and megalomanic character, episodes of rage.
Acute Paranoid Schizophrenia									
1	15	M	—	—	Ill. Metr.	Secy. of publishing co.	1 yr. H.S.	Student	Ideas of being tortured and pursued by spies, delusions of a world system, blocking, outbursts of rage.
2	46	M	7	1	Ind. Bt.	Manufacturer	3 yrs. coll.	Comptroller, Asst. advertising mgr.	Persecutory and homosexual delusions, blocking, depression, hypochondriasis.

Case No.	Age	Sex	Yrs. Married	Children	Where Raised	Father's Occup.	Educ.	Own Occup.	Specific Symptomatology
Acute Paranoid Schizophrenia (*continued*)									
3	40	F	22	1 dead 7 yrs.	Kan. Smt.	Store owner	2 yrs. H.S.	Housewife Bookkeeper Cashier Clerk (welder)	Delusions of persecution by gangs, anxiety, depressive trends.
4	23	M	—	—	Iowa Smt.	Physician	Coll. grad.	Medical student	Delusions of being poisoned and persecuted, violent rages, hypochondriasis, inappropriate blunted affect.
5	34	M	8	2	Ark. Mt.	Company operator	Coll. grad.	Secy.-treas. of company	Persecutory and homosexual delusions, anxiety, alternating urbane compliance and negativism.
6	46	M	3	—	La. Metr.	Sales mgr. of liquor co.	H.S. grad.	Business (salesman)	Delusions of persecution by gangs, confusion, depression, anxiety, hypochondriasis.
7	37	F	14	1	Kan. Smt.	Policeman	H.S., Bus. coll.	Housewife (mail carrier)	Delusions of reference, depression.
8	48	F	23	1	La. Mt.	Lumberman	H.S. grad.	Housewife (dentist)	Erotomanic and reference delusions, some inappropriateness of affect.
9	50	F	25	4	Ill. Mt.	Tailor, salesman, amusement park opr.	H.S.	Housewife (oil man)	Disorganized paranoid ideation, erotomanic and self-accusatory delusions, agitation.
10	34	M	—	—	Ind. farm	Farmer	H.S., Bus. coll. 2 mos., Coll. agriculture course	Farmer	Vague paranoid delusions, depression, withdrawal, mild confusion.
11	30	M	—	—	La. Mt.	Politician	Coll. grad.	Clerk in oil co.	Bizarre vague paranoid delusions, negativism, outbursts of rage.

Case No.	Age	Sex	Yrs. Married	Children	Where Raised	Father's Occup.	Educ.	Own Occup.	Specific Symptomatology
Chronic Paranoid Schizophrenia									
1	48	M	26	4	Mo. Smt.	Sporadic work	1 yr. coll.	Merchant, electrical work	Well retained front, conscious concealment of paranoid delusions, hypochondriacal anxiety.
2	45	F	M21 D1 M4	3	Okla. Smt.	Farmer, carpenter	Grammar school	Housewife, Practical nurse (1st husband switchboard opr., 2nd mechanic)	Delusions of infidelity, impulsive outbursts.
3	33	F	13	4	Tex. Bt.	Lawyer	2 yrs. coll.	Housewife (business executive)	Vague disorganized paranoid ideas, alternating excitement and depression, mild confusion.
4	21	M	—	—	Neb. Smt.	Grocery co. executive	1 term coll.	Clerk	Delusion of world order with megalomanic trends, bowel preoccupation, superficially polite front barely concealing intense hostility.
5	45	F	24	4	Tex. Bt.	?	H.S. grad.	Housewife, School teacher (odd jobs for father)	Delusions of persecution by Nazis, anxiety, depressive trend.
6	30	M	—	—	Kan. Mt.	Newspaperman	Coll. grad.	Printer, Draftsman, Salesman	Blunted affect, delusions of being poisoned and of reference, depressive trend.
7	25	M	—	—	Tex. Bt.	Oil producer	H.S. grad.	Oil producer	Megalomanic and reference delusions, well preserved front.
8	37	F	11	—	Mich. Metr.	Tailor	Coll. grad.	School teacher (physician)	Paranoid ideas about in-laws, delusions of infidelity, confusion.
9	37	F	4	2	Tex. Mt.	Rancher	1 yr. H.S.	Housewife, Stenographer (urologist)	Blandness, delusions of infidelity and reference.
10	18	M	—	—	Mich. Metr.	Public accountant	10th grade	None	Good front with far-reaching thought disorganization, disorganized delusions of persecution.

Case No.	Age	Sex	Yrs. Married	Children	Where Raised	Father's Occup.	Educ.	Own Occup.	Specific Symptomatology
Deteriorated Paranoid Schizophrenia									
1	33	M	—	—	Kan. Mt.	?	2 yrs. coll.	Odd jobs	Blandness, disorganized megalomanic trends, weird philosophizing, extramural existence.
2	48	F	—	—	Ill. Mt.	Accountant	2 yrs. H.S.	Filing clerk	Blandness, persecutory and erotomanic delusions and hallucinations.
3	53	F	M22 D8	1	Kan. Mt.	Partner in hdwe. co.	Coll. grad.	None	Blandness, seclusiveness, disorganized persecutory delusions, extramural existence.
4	44	F	M3 W4 M10 D9	1	Ga. Bt.	?	H.S.	Housewife	Blandness, silliness, word salad, incoherent, paranoid delusions.
5	31	F	—	—	Kan. farm	Farmer	H.S. grad., 1 yr. post-grad. in business	Domestic	Blandness, vague megalomanic and persecutory delusions.
6	37	F	—	—	Neb. Mt.	Brick and stone mason	H.S. grad., 1 yr. Business school	Stenographer	Open hostility and obscenity, disorganized delusions of being poisoned and sexually influenced.
Paranoid Condition									
1	46	F	—	—	Kan. Mt.	Owner of lumberyard and grain business	3½ yrs. coll.	Head of dept., music publishing co.	Transitory delusion of persecution, agitation, depression, work adjustment sustained for a while despite illness.
2	36	F	5	1 2 SC	Okla. Smt.	Owner grocery store	Coll. grad.	Housewife, Teacher (drug salesman)	Delusions of reference and persecution, some depressive trends, work adjustment sustained for awhile despite illness.
3	48	F	22	2 A	Kan. farm, Okla. farm	Farmer, mail carrier and postal clerk	Coll. grad.	Housewife, Teacher (business man)	Delusions of infidelity, and persecution, sex affair with minor, transitory depression and agitation, taught school at height of delusions.

Case No.	Age	Sex	Yrs. Married	Children	Where Raised	Father's Occup.	Educ.	Own Occup.	Specific Symptomatology
					Paranoid Condition (*continued*)				
4	35	F	M18 D5	—	Kan. Smt.	Father: engineering contractor; Foster father: merchant	Coll. grad.	Laboratory technician, unemployed	Transitory delusions of persecution, work adjustment sustained for awhile despite illness, hallucinated friendly as well as hostile voices.
5	34	F	15	2	Colo. Smt., Mt.	Lawyer	3 yrs. coll.	Housewife (geophysicist and businessman)	Isolated, delusional hatred of husband, compliant front concealing generalized paranoid attitudes.
6	45	F	25	1 A	Kan. farm	Farmer	H.S. grad., Nurses training	Nurse, housewife (physician)	Generalized paranoid attitudes, quarrelsomeness, delusions of infidelity.
7	32	M	—	—	Ill. Metr.	?	Coll., Law school	Salesman, Govt. position	Generalized paranoid and provocative attitudes.
8	35	F	M1½ D6 M4	—	Ala. Mt. Tenn. Bt.	Railroad laborer, Methodist minister	3 yrs. Boarding school, 1 yr. Indust. school	Housewife, Art student (1st husband real estate; 2nd, manufacturer)	Generalized paranoid attitudes, polite front concealing quarrelsome hostility.
9	30	M	6	1	Iowa Smt.	Owner grain elevator and coal yards, farmer	Law school	Attorney	Isolated delusion of infidelity, alcoholism.
10	49	F	20	9 3 dead	Kan. Smt.	Farmer	6th grade	Housewife	Isolated delusion of infidelity in a well-organized compulsive woman, depressive trends.
11	52	M	31	1	Mo. Metr., Okla. Smt.	Lawyer	H.S. grad.	Stenographer, Real estate, Sales mgr. of packing co.	Isolated transient delusion of erotomania in a well organized compulsive character.
12	37	F	11	2	Tex. farm	Farmer	3 yrs. coll.	Housewife, Bookkeeper (farmer)	Isolated delusion of erotomania, neurasthenic hypochondriacal complaints, passive negativism.

Case No.	Age	Sex	Yrs. Married	Chil-dren	Where Raised	Father's Occup.	Educ.	Own Occup.	Specific Symptomatology
Paranoid Condition (*continued*)									
13	45	F	25	2	Kan. Mt.	Deceased before patient born	Grammar school	Housewife (owner cleaning business)	Delusions of infidelity.
14	29	F	M1 D6 M5	1	Mo. Metr.	Railroad	H.S. grad., 1 yr. Business school	Housewife, Typist, Switchboard opr. (1st husband truck driver; 2nd doctor)	Delusions of infidelity, hysterical symptoms and makeup.
Simple Schizophrenia									
1	28	M	M3 D6 mos.	—	Tex. Mt.	Rancher	Coll. grad.	Officer, U.S.N.	"Hobo-ism", open belligerency, alcoholism, no clearcut delusions.
2	17	M	—	—	Okla. Smt.	Physician	H.S. student	Student	Flat affect with episodes of retardation and excitement, no clearcut delusions.
3	24	M	—	—	Tex. Bt.	Attorney	Jr. high school, Private tutors 1 yr.	Unemployed	"Hobo-ism" after docile adjustment, petty criminality, flat affect, no clearcut delusions.
4	15	M	—	—	Tex. Smt.	Owner of small business	Grammar school student	Student	Flat affect, withdrawal, retardation, autistic phantasy life.
5	18	M	—	—	Tex. Bt.	Supt. of electrical dept. at Tex. air base	2 yrs. H.S., Reform school	Student	Flat affect, criminality culminating in matricide.
6	20	M	M few weeks D	—	Kan. Mt.	V.-pres. of bank	1 yr. coll.	Student	Flat affect, "hobo-ism", complete unreliability, overt hostility toward parents, no delusions.
7	21	F	M1	—	Kan. Mt.	?	H.S. grad.	Stenographer, Switchboard operator (army)	Flat affect, promiscuity, no delusions.
8	19	M	—	—	Kan. Smt.	Postal clerk	2nd yr. of jr. coll.	Student	Flat affect, brief stuporous spells, depressive trend, no clearcut delusions.

Case No.	Age	Sex	Yrs. Married	Children	Where Raised	Father's Occup.	Educ.	Own Occup.	Specific Symptomatology
Simple Schizophrenia (*continued*)									
9	20	M	—	—	Kan. Smt.	Farmer	3 yrs. H.S.	Farmer	Some somatic complaints, undisguised incestuous wishes without affect.
Coarctated Preschizophrenia									
1	20	M	—	—	Ohio Bt.	Civil engineer	Private school	Student	Inappropriate affect, suicide attempts, polite front to the point of caricature.
2	16	M	—	—	Kan. Mt.	Stenographer	2 yrs. H.S.	Student	Compulsive and obsessive symptoms, transient feelings of depersonalization, fear of insanity.
3	20	M	—	—	Mo. Mt., Kan. Mt.	Baker	H.S. grad., Post-grad. courses	Office, Clerk, Bakery	Depressive trends, blocking, extremely tenuous object relations, near delusional "foster child" phantasy.
4	17	F	—	—	Kan. Mt.	Executive publishing co.	College 1st yr.	Student	Complaint of inability to think clearly, superficiality, some depressive trend, inappropriate affect.
5	39	M	—	—	Ill. Metr., Minn. Metr.	Store clerk	Dental college	Dentist	Anxiety, near delusional masturbatory guilt, inhibition, tenuous object relationships, extreme conscientiousness.
6	29	M	—	—	Kan. farm	Farmer	2 yrs. coll.	Farming	Overwhelming diffuse anxiety, inhibition, tenuous object relationships, neurasthenic symptoms.
7	41	M	19	—	Kan. farm	Farmer, small business owner	1 yr. H.S.	Farming, rents land	Anxiety, withdrawal, extremely tenuous object relationships, insomnia.
8	41	M	—	—	Kan. Smt.	Barber, unemployed	H.S. grad.	Merchant	Overwhelming anxiety, some phobic ideas, hypochondriasis, inhibition of any intimate human contact.

Case No.	Age	Sex	Yrs. Married	Children	Where Raised	Father's Occup.	Educ.	Own Occup.	Specific Symptomatology
Coarctated Preschizophrenia (*continued*)									
9	39	M	—	—	Kan. Smt.	Small business man	M.A. degree, 1 yr. business course	Graduate student, Teacher	Blandness, extreme paucity of object relationships, transient exacerbations with anxiety and reference ideas.
10	37	M	M1½ D9 M5	1	Canada Metr.	Head of large corporation	3 yrs. coll., Mining engrg.	Coal co. executive	Overwhelming anxiety, near delusional hypochondriasis, alcoholism, paranoid trends.
11	30	M	8	2	Kan. Smt.	Machine shop foreman, plant supt.	H.S. grad.	Office machine repair	All-pervading paralyzing anxiety, inhibition to the point of blocking.
12	30	M	—	—	Kan. Mt.	Railway layout man	Coll. grad., 1½ yrs. business school	Accountant	Extreme inhibition, severe anxiety, extreme orderliness and rigidity.
13	24	F	9 mos.	—	Wyo. ranch	Rancher	Coll. grad.	Housewife, Stenographer (lawyer)	Anxiety, preoccupation with subjectively experienced weakness of object relationship, self-corrected ideas of paranoid coloring.
14	20	F	—	—	N. Y. Metr.	Jeweler	1 yr. coll.	Student	Flat affect, compulsions without any anxiety.
15	25	F	—	—	Ill. Metr.	?	Nursing school	Nurse	Overwhelming anxiety with panic, suspiciousness and quarrelsomeness, depressive trend, tenuous object relationships.
16	25	F	—	—	Kan. Smt.	Farmer	Coll. grad.	Dietitian	Generalized inhibition, overwhelming anxiety, preoccupation with consciously experienced weakness of object attachments.

Case No.	Age	Sex	Yrs. Married	Children	Where Raised	Father's Occup.	Educ.	Own Occup.	Specific Symptomatology
Over-Ideational Preschizophrenia									
1	27	F	M3 mos. D4 yrs. M2½ (died)	1 (1 died)	Iowa Bt., La. Bt., Wyo. Mt.	Custodian	3½ yrs. H.S.	Night club hostess, Stock clerk, Statistical clerk (1st husb. army; 2nd state empl.)	Feelings of depersonalization, neurasthenic symptoms, preoccupation with self, intense phantasying, no delusions.
2	22	F	—	—	Tex. Bt.	Lawyer	Grad. stud.	Student	Intense phantasy life, preoccupation with self and sexual matters, impulsive sometimes bizarre behavior, anorexia, no delusions.
3	22	F	4	2	Wyo. Mt., Ark. Smt., Okla. Smt.	Teacher	3 yrs. coll.	Housewife (author)	Obsessed with fear of going insane, strong projective and some depressive trends, no clearcut delusions.
4	16	M	—	—	Ohio Bt., Ariz. Mt.	Real estate business	Boarding school	Student	Blunted affect, all-pervading phantasy life with magic omnipotence of thought as content.
5	21	M	—	—	Okla. farm, Kans. Smt.	?	H.S. incomplete	Odd jobs	Obsessive fear of going insane, panic states, preoccupation with self, feelings of depersonalization, transitory paranoid trends.
6	36	F	12	1	Ala. Smt.	Merchant	Coll. grad., 2 yrs. seminary	Housewife (dentist)	Obsessive features, impulsive outbursts of anger, paranoid trends, some blunting of affect, no delusions.
7	35	M	M2 D1 M13	1 (1 died)	Iowa Mt.	Physician	Coll. grad., M.D. degree	Surgeon	Conversion symptoms, impulsive inappropriate behavior, paranoid trends, no clearcut delusions.
8	20	M	—	—	N.Y. Bt.	Furniture business	H.S. incomplete	Student	Obsessions of sexual content, hypochondriasis, overpolite front concealing negativism, preoccupation with self, no clearcut delusions.

Case No.	Age	Sex	Yrs. Married	Children	Where Raised	Father's Occup.	Educ.	Own Occup.	Specific Symptomatology
Over-Ideational Preschizophrenia (*continued*)									
9	40	F	—	—	Penn.	Teacher, insurance	2 yrs. jr. coll.	None	Previous paranoid schizophrenic episode, incapacitating neurasthenic - hypochondriacal symptoms of semi-delusional character.
10	27	M	—	—	Ohio Smt., N. Y. Smt.	Engineer and small manufacturer	3 yrs. coll.	Worked for father	Flat affect, preoccupation with self, vague philosophical speculations, no clearcut delusions.
11	30	M	—	—	Kan. Mt.	Farmer, church deacon	Coll. grad.	Taking grad. courses, Clerk, Teacher	Flat affect, preoccupation with and philosophical speculation about himself, unconcern with his appearance.
12	34	F	11	1 A	Wash., D. C., Calif., Ohio	Aircraft corp. representative	3 yrs. coll.	Housewife (aircraft corp. executive)	Preoccupation with self, anxiety, suicidal impulses, sexual escapades.
13	40	M	—		Ill. Metr., Kan. Farm	Farmer, day laborer	1 yr. H.S.	Salesman	Obsessive ideation, anxiety, masturbatory preoccupation, preoccupation with self, no delusions, paucity of interpersonal relationships.
14	19	F	—	—	Kan. Bt.	Deceased when patient 9	Coll. stud.	Student	Anxiety, preoccupation with self and conscious experience of tenuousness of object relationships, depressive trend and suicidal impulses.
15	38	M	10	3	Mich. Metr.	Street car conductor	Law school grad.	Lawyer, Payroll clerk, Postal clerk	Obsessions, sexual preoccupations, preoccupations with self, somatic preoccupations, some of which approached delusions.
16	37	M	M2 D2 M9	2	Mid-West Smts.	Traveling salesman	3 yrs. coll.	Traveling salesman	Obsessional thinking, anxiety, hypochondriacal complaints, inappropriate affect.
17	33	F	—	—	Kan. Smt.	Bakery	Coll. grad.	Salesgirl, Clerk	Previous psychotic episode, overt homosexuality, compulsions, obsessions, depression, anxiety.

Case No.	Age	Sex	Yrs. Married	Children	Where Raised	Father's Occup.	Educ.	Own Occup.	Specific Symptomatology
					Psychotic Depression				
1	53	F	31	3	La. Smt.	Sugar planter	1 yr. H.S.	Housewife, Teacher (pump co. executive)	Apathy, retardation, guilt over thoughts of husband's infidelity.
2	59	M	26	2	Kan. farm	Farmer	4th grade, 1 yr. seminary	Farmer	Depressed mood, self-depreciation, guilt feelings and asking for punishment, paranoid trend of delusional intensity.
3	36	F	7	—	Okla. farm	Farmer	3½ yrs. coll.	Housewife, Teacher (store manager)	Depression, ideas of sinfulness for both present and past behavior, paranoid delusion.
4	30	F	9	3	Mo. Metr.	Manufacturer	1½ yrs. coll.	Housewife (lawyer)	Feelings of hopelessness, self-condemnation, agitation, obsessional trends.
5	59	M	M31 W2	3	Mich. Metr.	Laborer	Law school grad.	Attorney	Depression, retardation, feelings of hopelessness, preoccupation with sexuality and with long-past transgressions, paranoid trend.
6	68	M	46	3	Ohio Metr.	Fruit grower	H.S. grad.	Retired farmer, Fireman on railroad, Grocery clerk	Feelings of sinfulness for both present and past, agitation, depression.
7	51	F	Approx. 26	2	Okla. Bt.	Business man	H.S.	Housewife (tailor)	Recurrent depression, self-accusations, feelings of hopelessness, agitation, suicidal attempts.
8	32	F	31	2	Okla. Bt.	Merchant	H.S. grad.	Housewife (tailor)	Alternating depressed and manic episodes, depression at the time of testing.
9	60	M	38	6	Ill. farm	Farmer	7th grade	Farmer	Depression, agitation, compulsive chronic worrying.
10	32	F	—	—	Okla. Smt.	Merchant	H.S. grad.	Secretary	Delusions of sinfulness, retardation, refusal of food, schizoid inhibited personality

Case No.	Age	Sex	Yrs. Married	Children	Where Raised	Father's Occup.	Educ.	Own Occup.	Specific Symptomatology
Involutional Depression									
1	63	F	M32 W8	2	Ind. Mt.	Broker, stone co. executive	1 yr. coll.	Housewife	Series of depressions, suicidal thoughts, self-accusations, some bodily preoccupations, no delusions.
2	67	M	23	2 (3 died) in infancy)	Iowa farm	Lumberman	Med. coll.	Physician	Rigid compulsive personality, beginning senescence, slight confusion and memory loss, reactive depression with fear of somatic disease.
3	55	M	28	—	Kan. farm	Farmer	10th grade, Vet. school	Veterinarian	Compulsive personality, beginning senescence, reactive depression with hypochondriasis of almost delusional intensity.
4	60	M	16	—	Ind. Bt.	Telegraph co. executive	H.S. grad.	Architect	Compulsive personality, anxiety and depression, suicidal attempt without appropriate affect.
5	62	F	39	2	Tex. Smt.	Lumberman	H.S. grad., 2 yrs. finishing school	Housewife (unemployed)	Compulsive chronic worrying, previous depressed episode, beginning senescence, retardation, tearfulness, some hypochondriacal ideas.
6	60	F	40	9	Kan. Smt.	Farmer	8th grade	Housewife (farmer)	Agitated depression, senescence, religious preoccupation, ideas of sinfulness for both present and past.
7	57	M	18	1	Ill. farm	Farmer	8th grade	Farmer	Depression, hypochondriasis, senescence.
Severe Neurotic Depression									
1	44	F	21	—	Kan. Mt.	Farmer	3 yrs. coll.	Music teacher (teacher)	Depression, obsessional preoccupation with suicide and fear of insanity, projective and hypochondriacal trends.

Case No.	Age	Sex	Yrs. Married	Children	Where Raised	Father's Occup.	Educ.	Own Occup.	Specific Symptomatology
					Severe Neurotic Depression (*continued*)				
2	59	F	33	—	Kan.	Time-keeper	Grammar school	Housewife, Cashier (building contractor)	Depression, agitation, histrionics, feelings of inferiority.
3	52	M	29	1	Mo. Smt.	Farmer	Grammar school	Telegraph engineer	Reactive depression, retroactive guilt for things past, feelings of incompetence.
4	59	M	28	—	Kan. Smt.	Farmer	H.S. grad.	Salesman, Telegrapher	Depression, retroactive guilt for extramarital affairs, preoccupation with feelings of failure.
5	36	M	3½	1 SC	Penn. Smt.	Auto parts dealer	3 yrs. H.S.	Merchant	Depression, mild retardation, preoccupation with fear of somatic illness.
	46	M	22	1	Mich., Ill. Metr., Mo. Metr.	Died before birth, Mother: nurse	Business school	Contractor	Reactive depression, feelings of inferiority and degradation centering around sex.
7	38	M	15	1	Kan. farm	Farmer, oil man	Grammar school	Farmer	Reactive depression, suicidal attempts, Parkinsonism.
8	34	M	13	3	Kan. Smt.	Farmer	H.S. grad.	Barber	Depression, retardation, schizoid make-up, neurasthenic features.
9	59	F	27	1	Kan. farm	Farmer	H.S. grad.	Housewife (Bookkeeper, Grocery clerk, Domestic)	Reactive depression, feelings of inferiority and unworthiness, loss of interest, suicidal thoughts.
					Neurotic Depression				
1	35	F	12	2	Eng. Metr.	Nomadic minstrel and entertainer (alcoholic)	Convent, Private, fine arts school, Music conservatory	Pianist (pediatrician)	Reactive depression, occasional agitation, obsessional ideas, compulsive personality.
2	39	F	?	2 A	Ohio, Tex. Mt.	Oil man	H.S. 2 yrs., finishing school	Housewife (1st husb. worked for father; 2nd business man)	Depression, anxiety, alcoholism.

Neurotic Depression (*continued*)

Case No.	Age	Sex	Yrs. Married	Children	Where Raised	Father's Occup.	Educ.	Own Occup.	Specific Symptomatology
3	40	M	10	—	Ind. Bt.	Country physician	College, Med. coll.	Pathologist	Depression, anxiety, obsessive preoccupation with guilt about sexual difficulties.
4	60	M	M2 W4 M33	1 1 died	Ind. Smt.	Farmer	H.S.	Farmer, Manufacturer	Episodes of depression, marital conflict, compulsive personality.
5	41	F	15	2	Iowa Smt.	Veterinarian	Coll. grad.	Housewife, Teacher (dentist)	Depression, obsessional thinking, obsessive ideas about body and fear of insanity.
6	37	F	16	1 (died)	Kan. Mt.	Automobile salesman	3 yrs. H.S.	Housewife, Clerk (attorney)	Series of depressions, anxiety, suicidal thoughts.
7	30	F	4	1	Ala., Ohio Metr.	Unsuccessful business man	Coll. grad.	Housewife, Nursery school and social worker (lawyer)	Depression, obsessional ideas, suicidal gesture.

Hysteria

Case No.	Age	Sex	Yrs. Married	Children	Where Raised	Father's Occup.	Educ.	Own Occup.	Specific Symptomatology
1	55	F	—	—	Ind. Smt.	Unsuccessful farmer, groceryman, editor	Home economics school	Dietitian, Teacher	Conversion symptoms, phobias, depressive trend, compulsive character.
2	40	M	3	—	Mo. Mt.	Lawyer	Coll. grad.	Bookkeeper, Odd jobs, Partnership in unsuccessful business	Conversion symptom, question of malingering, passive negativism, no anxiety.
3	31	M	M3 Anu M10	5 (2 died)	Calif. farm	Supervisory position with city offices	1½ yrs. coll.	Manager of city office, Clerk, Executive of small business	Fugues with loss of personal identity, mild conversions, depression, anxiety.
4	32	F	M10 D M	1	Ark. Smt.	Editor and business man	1 yr. coll.	Housewife, Bookkeeper (works for father-in-law, real estate, mechanics aid)	Conversion symptoms, neurasthenic trends, depressive trends, anxiety.
5	34	F	?	2	Neb. Smt.	?	H.S. incomplete	Housewife	Conversion symptoms, phobia, intense anxiety, depression.

Case No.	Age	Sex	Yrs. Married	Children	Where Raised	Father's Occup.	Educ.	Own Occup.	Specific Symptomatology
					Hysteria (*continued*)				
6	27	F	2½	—	Ind. Bt.	Publishing co. executive	Coll. grad.	Housewife (med. student)	Acute anxiety attacks, somatic anxiety symptoms between attacks, mild phobic trend.
7	22	F	—	—	Kan. farm	Farmer	Grade school	Housework	Conversions: headache and tubular vision, generally indifferent to symptoms though occasionally somewhat anxious.
8	24	F	—	—	Kan. Mt.	Physician	Junior college	Stenographer, Newspaper reporter	Conversions: astasia-abasia, dysarthria, depressive trend.
9	29	F	M1 D6 M5	1	Mo. Metr.	Railroad worker	H.S. grad., 1 yr. business college	Housewife, Typist, Switchboard opr. (1st husb. truck driver; 2nd husb. doctor)	Phobic trend, somatic symptoms, histrionic suicidal attempts, paranoid trend (see Paranoid Condition, no. 14).
10	34	F	8	1	Kan. Smt.	—	H.S.	Housewife (school teacher, salesman)	Conversions, histrionics.
11	39	F	M1 day Anu M13	1	Mo. Metr.	Lawyer	1 yr. coll.	Housewife	Phobias, anxiety, passive negativism.
12	27	F	5	1	Kan. Mt.	Business man	H.S. grad.	Receptionist (doctor's)	Anxiety rising to panics with somatic manifestations, passive childish character.
13	47	F	27	3	Colo., Iowa Smts.	Miner, died, patient 3; Raised by uncle 10 yrs., priest 7 yrs.	H.S. grad.	Housewife (manager of large concern, large property owner)	Histrionics, bodily symptoms, childish impulsive behavior.
14	37	F	M8 D8 M5	—	Tex., Calif. Smt.	Machinist	H.S. grad.	Housewife, Nurse (1st husb. truck driver; 2nd salesman, private income)	Anxiety with bodily symptoms, affective lability, impulsiveness.

Case No.	Age	Sex	Yrs. Married	Chil-dren	Where Raised	Father's Occup.	Educ.	Own Occup.	Specific Symptomatology
Hysteria (*continued*)									
15	29	F	3	2	Vienna	Technician in factory	Convent, 1½ yrs. dramatic school	Actress (producer)	Anxiety with bodily symptoms, phobic trends, conversions, childish and histrionic behavior.
16	30	F	3	1	Maine Smt.	Farmer	2 yrs. normal school	Housewife, Teacher	Vaginal conversion symptoms, affective lability.
17	32	M	M1 D6	—	Ill. Smt.	Doctor	2 yrs. post grad., 3½ yrs. med. school	Dept. store salesman, Buyer	Anxiety attacks with conversion symptoms, passive inhibited personality.
18	14	F	—	—	Wis. Mt.	Veterinary surgeon, runs drug store	1 yr. H.S.	Student	Fugue-like attacks, histrionics, anxiety.
19	29	F	5	—	Ind. Smt.	Salesman	Grad. teacher's coll.	Housewife, Teacher (salesman)	Anxiety, some phobic trends, affective lability.
Anxiety and Depression									
1	33	M	—	—	Mo. Mt.	Partner in small business, mgr. local store	Coll. grad.	Salesman	Anxiety at times rising to panics, depression, feelings of inadequacy.
2	32	M	8	—	N. M. Mt.	Contractor, automobile and insurance business	Coll. grad.	Chemist	Anxiety, depressive trend, generalized inhibition, compulsive character trends.
3	42	M	12	—	Kan. Smt.	Interpreter, secy. to railway official	H.S. grad.	Salesman	Anxiety, depression, feelings of inadequacy, some bodily symptoms.
4	37	M	18	3	N. D. Mt.	Owner of small business	Coll. grad.	Owner of business	Anxiety, depression, obsessive ideation, compulsive personality.
5	43	M	—	—	Tex. Mt.	?	Med. school	Physician, Army officer	Anxiety, reactive depression, compulsive character.
6	62	M	34	2	Mo. Mt., Nebr. Mt.	Store owner	Grade school	Retired executive of lumber company, Salesman, Salesmanager	Anxiety, depression, compulsive character.

Case No.	Age	Sex	Yrs. Married	Children	Where Raised	Father's Occup.	Educ.	Own Occup.	Specific Symptomatology
Anxiety and Depression (*continued*)									
7	37	M	11	1	Mo. Farm	Farmer	Med. school	Physician	Anxiety, depression, inhibition, schizoid trends.
8	50	F	M15 W9	1 (1 stillbirth)	Mo. Smt.	Banker	Jr. coll., Coll. grad.	Teacher (cashier)	Anxiety with bodily symptoms, reactive depression, obsessive trends.
9	26	F	—	—	Ohio Smt.	Small business owner	Coll. grad.	Teacher	Anxiety, depression, generalized inhibition, rigid passive personality.
10	33	F	—	—	Miss. Smt.	Farmer	Nursing school	Nurse	Anxiety, depression with suicidal trends, addiction.
Mixed Neurosis									
1	31	F	4	1	N. Y. Metr., N. J. Mt., N. Y. Mt.	Supreme court referee	Coll. grad., M.A.	Housewife, Music teacher (college teacher)	Phobias, obsessive ideas, extramarital affairs, some somatic symptoms.
2	37	F	15	2	Okla. Smt., Kan. Bt.	Insurance agent—unsuccessful	1½ yrs. coll.	Housewife, Worked in bank (banker)	Anorexia nervosa.
3	25	M	3	2	Kan. Smt.	Barber, advertising agent	3 yrs. coll.	Print shop, Gas station mgr., Student, free-lance writing	Phobias, obsessional ideas, severe anxiety, some conversion symptoms.
4	29	F	—	—	Kan. farm	Grammar school	H.S. incomplete	Housekeeper	Extreme anxiety rising at times to panic and at times to blocking, phobias, depression, obsessive ideas, schizoid trend.
5	53	M	?	7	S.D. farm	Farmer	4 yrs. coll.	Statistician, then Supt. of company	Phobias, obsessional ideation, much anxiety.
6	36	M	M1 mo. D4 M5 D5	—	Ohio Metr.	Business man	5 mos. coll.	Worked for father, now unemployed	Agitation, depression, obsessive ideation, phobic symptoms, schizoid trend, suicide.
7	28	F	5	1	Kan. Mt., Va. Tex.	Carpenter	3 yrs. H.S.	Housewife (cable splicer)	Conversion symptoms, much anxiety, obsessive ideation, depressive trends.

Case No.	Age	Sex	Yrs. Married	Children	Where Raised	Father's Occup.	Educ.	Own Occup.	Specific Symptomatology
Mixed Neurosis (*continued*)									
8	29	M	7	2	Kan. Smt.	Section foreman	Coll. grad	Teacher, Investigator for credit company	Phobic - obsessional ideation, much anxiety, mild conversion symptoms.
9	26	F	—	—	Okla. Smt., Kan. Smt.	Locomotive engineer	Coll. grad.	None	Phobias, obsessions, schizoid and some depressive trends.
10	39	F	13	2	Wis. Smt.	Oil producer	2½ yrs. coll.	(hotel operator)	Phobic symptoms, obsessional ideas, depression, strong schizoid trend.
Obsessive-Compulsive Neurosis									
1	45	M	—	—	Canada Bt.	Garage operator	H.S. grad.	Bookkeeper, Stenographer, Clerk	Compulsions, obsessions, sexual inhibition and preoccupation, compulsive character.
2	26	M	—	—	Kan. Bt., Kan. Metr.	Lumberman	Coll. grad.	Teacher	Multiform obsessions, compulsions, sex-perversion.
3	27	F	M3 W1 mo.	Pregnant	Kan. Smt.	Professor	Coll. grad.	Housewife, Teacher, Secy. to physician	Obsessional ideas, obsessional personality.
4	41	F	10	—	Mo. Smt., Okla.	Laundry (pastor)	H.S. Coll. (incomplete)	Housewife, Music teacher, Pianist	Obsessions, impulsive suicidal attempts, anxiety.
5	72	F	M27 W7	4	Tex. Smt.	Attorney	H.S.	Teacher, Housewife (attorney)	Obsessions, some rituals, compulsive character.
6	55	F	M19 W6 M6	1 A	Ill. Metr.	Owner of manufacturing business	2 yrs. coll.	(artist and architect)	Obsessions, paranoid trends, preoccupation with self.
7	36	M	?	?	?	Farmer		Insurance salesman	Constant obsessional preoccupation with his jaw and tongue, compulsive personality.
8	30	F	8	—	Tex. Smt., Kan. Smt., Mt.	Traveling salesman	H.S. grad., Finishing school	Housewife	Obsessions, globus hystericus, previous episode of depersonalization.

Case No.	Age	Sex	Yrs. Married	Children	Where Raised	Father's Occup.	Educ.	Own Occup.	Specific Symptomatology
Obsessive-Compulsive Neurosis (*continued*)									
9	57	M	M13 D2 M16	1 A	Ind. farm	Farmer	Medical school	Physician	Constant obsessional preoccupation with prostate and anus, depression with slight agitation, compulsive character.
10	14	F	—	—	Kan. Smt.	Civil engr.	1st yr. H.S.	Student	Obsessions, compulsions, refusal to eat.
11	19	F	—	—	Iowa Mt., Mo. Metr.	Salesman	H.S., incomplete	Student	Compulsive ritual, blunted affect, passive negativism.
12	28	F	—	—	Calif. ranch	Ranch owner	Coll. grad., Post-grad. work	Student journalism	Obsessive doubt-ridden character, no obsessions, depressive trend.
13	42	M	—	—	Md. Metr.	Doctor	College	Architect, Made films, Asst. ed.	Obsessive doubt-ridden character, depressive trends, severe sexual inhibition, no obsessions.
14	42	M	—	—	Tex. Bt.	Bank executive (divorced shortly after birth)	3½ yrs. coll.	Manager family estate	Obsessive personality, preoccupation with the idea of homosexuality, no obsessions.
15	38	F	15	2	N. Y. Metr.	Alcoholic, in sanitarium most of time	B.S. degree	Housewife, Student for M.A. degree (med. school prof.)	Obsessional doubt-ridden personality, no obsessions.
16	29	M	—	—	Mo. Smt.	Business man	B.A. from coll., Law school	Lawyer	Obsessional personality, insomnia, no obsessions.
17	32	M	12	2	Neb. Mt.	Lawyer	3½ yrs. coll.	Traffic engineer	Obsessional personality, pre-obsessive preoccupation with question of wife's fidelity.
Neurasthenia									
1	44	M	19	2	Ind. Smt.	Barber	1 yr. H.S.	Groceryman	Hypochondriacal preoccupations chiefly about prostate, fatigue, depressive trend.

Case No.	Age	Sex	Yrs. Married	Children	Where Raised	Father's Occup.	Educ.	Own Occup.	Specific Symptomatology
					Neurasthenia (*continued*)				
2	38	F	—	—	Okla. Smt.	Farmer	B.S. degree from teachers coll.	Teacher	Neurotic invalidism, chronic incapacitating fatigue, passive negativism, depressive trend, bodily preoccupation, blunted affect.
3	44	M	16	—	Tenn. Smt.	Farmer, small political jobs	3 yrs. H.S., 3-4 mos. pharmacy course	Apprentice pharmacist, Owner of drug store	Chronic fatigue, bodily preoccupations, chiefly about heart, very little anxiety.
4	40	M	18	3	Neb. farm	Farmer	Grade school	Owner of small store, Farmer, Shop foreman of garage	Vague generalized bodily complaints, chronic fatigue, depressive trend.
5	47	M	34	1 A	Mo.	Farmer, country merchant, recorder of deeds	3 yrs. H.S.	Executive of small railway co.	Chronic fatigue, vague bodily complaints, some obsessional thinking, depressive trend.
6	34	M	13	3	Kan. Smt.	Farmer	H.S. grad., Barber coll.	Barber	Chronic fatigue, vague bodily complaints, depressive trends, schizoid personality.

Case No.	Age	Sex	Yrs. Married	Children	Father's Occup.	Educ.	Own Occup.	Specific Symptomatology*				
								Anx.	Inhib.	Dep.	Imp.	Schiz.
						Well-Adjusted Patrol						
1	32	M	13	1	Farmer	1 yr. coll.	Patrolman, Farmer, Plumber	1	1	1	0	0
2	25	M	3	1	Farmer	2 yrs. coll.	Patrolman, Teacher, Farmer, Jack-of-all-trades	1	1	0	1	0
3	40	M	20	2	Laborer	3 yrs. coll.	Patrolman, Teacher, Cafe, Laborer	0	2	0	0	0
4	42	M	M8 D12 M1	—	Policeman	H.S. grad., Police school	Patrolman, Clerk, Police	2	2	0	0	0
5	39	M	—	—	Policeman	3 yrs. H.S.	Patrolman, Athlete, Police	0	0	0	2	0

* Anx.—Anxiety; Inhib.—Inhibition; Dep.—Depression; Imp.—Impulsive; Schiz.—Schizoid. For the ratings 0, 1, 2 appearing in these columns, see p. 30

Case No.	Age	Sex	Yrs. Married	Children	Father's Occup.	Educ.	Own Occup.	Specific Symptomatology				
								Anx.	Inhib.	Dep.	Imp.	Schiz.
Well-Adjusted Patrol (*continued*)												
6	48	M	25	2	Farmer	1 yr. coll.	Patrolman, Farmer, Marine	0	2	0	0	0
7	41	M	17	—	Farmer	2 yrs. H.S.	Patrolman, Farmer, Gas station, Police	2	0	1	1	0
8	37	M	15	2	Rural postman	1 yr. coll.	Patrolman, Farmer, Truck driver	0	0	0	1	0
9	32	M	10	3	Blacksmith	H.S. grad.	Patrolman, Salesman, Laborer, Jack-of-all-trades	1	0	0	2	0
10	32	M	5	—	Farmer	H.S. grad.	Patrolman, Grain inspector	1	2	1	0	0
11	51	M	30	5	Hardware	H.S. grad.	Patrolman, Hardware, Farmer, Teacher, Police	0	0	0	0	0
12	36	M	6	—	Carpenter	1 yr. coll.	Patrolman, Jack-of-all-trades	0	0	0	0	0
13	46	M	3	—	Farmer	1 yr. H.S.	Patrolman, Barber, Farmer	1	1	0	0	0
14	27	M	7	2	Farmer	1 yr. coll.	Patrolman, Teacher, Farmer	1	2	0	0	0
15	44	M	9	2	Farmer	H.S. grad.	Patrolman, Clerk, Mechanic	1	2	0	0	2
16	29	M	5	2	Newspaper	Coll. grad.	Patrolman, Newspaper, Jack-of-all-trades	1	1	0	0	1
17	34	M	10	—	Farmer	H.S. grad.	Patrolman, Teacher, Farmer	2	2	0	0	0
18	27	M	6	—	Farmer	2 yrs. coll.	Patrolman, Teacher, Clerk, Farmer	0	2	0	0	0
19	29	M	5	2	Farmer	H.S. grad.	Patrolman, Salesman, Mechanic, Jack-of-all-trades	2	2	0	0	0
20	38	M	17	2	Farmer	1 yr. coll.	Patrolman, Farmer, Meat cutter, Salesman	2	1	0	0	0
21	36	M	14	2	Banking	B.S. degree, some grad. work	Patrolman, Police	2	1	0	0	0
22	39	M	22	2	Mail carrier	H.S. grad.	Patrolman, Gas station	0	2	0	0	1

Case No.	Age	Sex	Yrs. Married	Children	Father's Occup.	Educ.	Own Occup.	Specific Symptomatology				
								Anx.	Inhib.	Dep.	Imp.	Schiz.
Well-Adjusted Patrol (*continued*)												
23	33	M	8	1	Guard	H.S. grad.	Patrolman, Construction work	0	1	0	1	0
24	33	M	9	1	Grocer	Senior H.S.	Patrolman, Salesman, Grocery	1	1	0	0	0
25	46	M	28	1	Police	2 yrs. H.S.	Patrolman, Police, Blacksmith	0	2	0	0	0
26	44	M	22	3	Teacher, Machinist	2 yrs. H.S.	Patrolman, Police, Army	0	0	1	0	0
27	35	M	15	4	Farmer	2 yrs. H.S.	Patrolman, Farmer, Police	0	1	0	0	1
28	37	M	14	1	Well-driller	3 yrs. H.S.	Patrolman, Gas station, Police	0	0	1	1	0
29	33	M	6	1	Plumber	H.S.	Patrolman, Jack-of-all-trades	2	0	0	0	1
30	28	M	3	—	Police	Coll. grad.	Patrolman, Butcher	0	1	1	1	0
31	43	M	20	1	Railroad	H.S.	Patrolman, Mechanic	0	1	0	0	0
32	35	M	14	1	Oil business and politics	1 yr. coll.	Patrolman, Truck driver	1	1	0	0	0
Borderline-Adjusted Patrol												
1	31	M	6	—	Business, Farming	Military acad., 1½ yr. coll.	Patrolman, Farmer, Salesman	2	0	1	2	0
2	33	M	—	—	Live-stock dealer	H.S. grad.	Patrolman, Jack-of-all-trades	2	3	0	0	0
3	25	M	6	2	Farmer, Laborer	H.S. grad.	Patrolman, Farmer, Farming admin.	2	2	2	0	0
4	35	M	3	1	Farmer	H.S. grad.	Patrolman, Farmer	3	2	0	0	0
5	30	M	4	2	Farmer	H.S. grad.	Patrolman, Farmer	2	0	0	2	0
6	32	M	10	2	Laborer, Farmer	H.S. grad., Business coll.	Patrolman, Farmer	2	2	2	0	2
7	35	M	8	2	Farmer	H.S. grad.	Patrolman, Farmer, Police	0	1	0	2	0
8	27	M	10	4	Farmer	1½ yrs. H.S.	Patrolman, Farmer, Guard	2	0	0	1	2

Case No.	Age	Sex	Yrs. Married	Children	Father's Occup.	Educ.	Own Occup.	Specific Symptomatology				
								Anx.	Inhib.	Dep.	Imp.	Schiz.
					Borderline-Adjusted Patrol (*continued*)							
9	43	M	17	1 died	Accountant	H.S. grad.	Patrolman, Police inspector	1	2	2	0	0
10	35	M	9	2	Real estate	H.S. grad.	Patrolman, Golf pro, Mechanic	2	0	1	2	0
11	40	M	18	2	Politician	H.S. grad.	Patrolman, Highway inspector, Farmer	2	0	0	1	0
12	31	M	10	1	Farmer	H.S. grad.	Patrolman, Police, Truck driver	0	0	0	0	0
13	31	M	2	1	Salesman, Laborer	H.S., ½ yr. coll.	Patrolman, C.C.C. laborer	1	0	0	1	0
14	39	M	19	3	Farmer	H.S. grad.	Patrolman, Police	0	2	2	0	2
15	29	M	3	3	Farmer	1 yr. coll.	Patrolman, Teacher	1	2	0	0	1
16	25	M	4	1	Farmer	1 yr. coll.	Patrolman, Grocery clerk, State customs inspector	2	2	2	0	1
17	32	M	6	1	Editor, Car dealer	1 yr. coll.	Patrolman, Auto racer, Police, Salesman	2	0	0	2	0
					Maladjusted Patrol							
1	29	M	6	—	Grocer	1 yr. coll.	Patrolman, Filling station, Oil fields	2	1	0	0	0
2	29	M	5	—	Dentist	1 yr. coll.	Patrolman, Jack-of-all-trades	3	1	2	0	0
3	29	M	9	2	Teacher, Aircraft	2 yrs. coll.	Patrolman, Jobs for highway dept.	1	0	2	2	0
4	30	M	—	—	Detective	H.S. grad.	Patrolman, Sports official, Salesman	1	2	3	2	2
5	26	M	3	1	Laborer	2 yrs. coll.	Patrolman, Teacher, Grain elevator	2	3	0	0	2

APPENDIX II

GROUP AVERAGES AND INDIVIDUAL SCORES OBTAINED IN THIS STUDY

TABLE A.—BELLEVUE SCALE: AVERAGE SUBTEST SCORES AND IQ'S

Group	Verbal Subtest Scores							Performance Subtest Scores					IQ's		
	N	Vo-cab	Comp	Info	Sim	Dig. Sp.	Arith	P.A.	P.C.	B.D.	O.A.	D.S.	V.IQ	P.IQ	Total IQ
U Sch A	17	11.9	10.7	11.8	11.1	11.1	9.3	9.1	9.0	10.4	8.8	9.7	108.8	99.3	104.6
U Sch Ch	13	12.4	10.1	12.5	12.1	9.5	10.0	11.0	10.3	11.8	10.4	10.5	109.6	108.3	110.0
U Sch D	7	10.7	7.7	10.6	9.4	8.0	6.0	3.7	5.1	9.4	11.1	5.9	96.1	90.7	91.6
P Sch A	11	11.9	10.5	11.7	12.1	8.5	10.5	8.7	8.8	10.7	8.8	8.7	109.6	104.6	107.9
P Sch Ch	10	11.9	10.6	10.8	10.7	9.9	9.8	9.1	8.8	10.5	9.8	9.5	107.2	104.3	106.1
P Sch D	5	11.6	9.8	10.8	9.6	7.6	7.6	6.8	9.8	10.4	10.2	9.0	100.6	106.0	104.2
P Co	13	13.2	11.8	13.3	13.5	10.8	10.5	10.2	10.2	11.5	10.9	12.0	117.0	116.0	118.3
S S	9	9.8	10.2	11.0	9.1	8.4	8.4	9.4	9.0	10.7	11.6	10.1	100.4	100.6	100.8
Pr C	16	12.0	11.7	13.2	12.6	9.6	10.2	9.5	9.5	11.3	10.4	10.6	113.4	103.9	111.7
Pr O-I	16	14.4	12.9	14.1	14.6	12.0	13.3	11.2	11.9	13.2	11.6	12.2	124.3	117.1	123.0
D P	8	10.2	7.9	9.4	9.2	6.2	7.6	6.4	4.1	4.9	4.8	5.5	97.4	84.2	91.0
D I	7	11.3	10.3	9.4	9.3	7.1	7.7	5.6	6.1	6.3	7.9	5.1	102.9	94.6	99.9
D S N	9	11.0	10.2	10.9	12.0	8.6	10.6	8.3	8.9	8.3	8.2	7.8	109.2	102.4	107.4
D N	7	12.4	10.3	12.0	12.7	9.6	8.6	10.1	10.1	10.7	9.3	10.3	109.6	112.0	111.7
Hy	18	12.2	12.0	11.6	12.6	9.2	11.0	11.5	9.8	11.4	9.9	11.3	112.1	111.1	112.8
A&D	10	13.4	13.8	13.5	14.3	9.7	11.4	11.9	10.6	11.1	9.8	11.2	119.8	114.8	119.0
MN	9	12.0	12.7	12.6	13.6	9.4	9.8	10.1	10.7	11.9	10.9	12.1	114.1	113.0	114.4
O-C	16	13.4	12.3	13.5	12.6	10.1	11.0	10.1	10.1	11.4	11.1	10.8	116.8	112.8	116.6
Neuras	6	10.8	10.7	11.2	11.3	8.8	11.0	7.5	9.0	9.2	7.3	10.0	110.2	102.2	107.2
P (1)	32	12.7	12.7	13.0	12.4	10.7	11.5	10.7	11.7	11.8	11.1	11.3	117.0	117.0	118.3
P (2)	17	11.7	12.1	11.7	11.1	10.8	10.8	9.5	10.2	10.6	9.3	11.2	112.2	107.8	110.9
P (3)	5	11.6	12.2	12.4	12.2	11.6	11.8	11.8	12.4	13.4	10.6	12.6	115.8	117.6	117.8

TABLE B.—Bellevue Scale Subtest Scores for All Cases

No.	Voc.	C	I	S	D	A	V. IQ	PA	PC	BD	OA	DS	P. IQ	Total IQ
Acute Unclassified Schizophrenia														
1	9	9	8	7	13	3	91	7	6	5	7	6	73	81
2	14	8	12	15	16	10	117	8	3	5	7	6	80	100
3	11	11	10	11	7	9	105	10	8	8	2	13	105	105
4	12	11	10	12	10	10	107	12	12	12	7	14	112	110
5	13	14	12	13	11	13	119	11	12	11	9	13	110	116
6	14	12	13	13	7	10	110	7	9	10	10	7	97	104
7	15	13	10	10	6	13	106	7	8	10	10	12	95	101
8	14	15	15	13	13	10	123	15	8	14	12	14	122	124
9*														
10	7	8	8	5	9	3	83	6	4	9	12	8	85	82
11	9	7	10	14	9	7	100	7	7	12	8	8	92	96
12	13	12	16	16	11	13	126	14	13	12	12	10	125	128
13	7	5	13	6	13	3	92	6	7	7	7	5	73	81
14	13	12	14	14	13	12	123	12	10	12	8	11	103	115
15	11	10	11	9	10	10	104	11	14	11	11	9	106	106
16	11	6	10	7	17	12	106	5	8	9	7	9	83	94
17	15	15	14	9	10	10	114	9	10	14	8	8	106	111
18	14	14	15	14	14	10	124	8	14	16	12	12	121	124
Chronic Unclassified Schizophrenia														
1	10	11	13	11	9	6	104	14	13	12	12	7	113	109
2	12	6	11	14	10	10	106	7	7	7	7	8	88	100
3	10	8	9	9	4	9	90	7	2	11	13	9	87	87
4	16	13	14	15	10	13	124	11	12	7	5	11	97	111
5*														
6	14	11	15	14	10	10	117	13	12	14	13	15	122	123
7	14	14	11	13	6	10	110	14	13	12	12	9	121	117
8	15	11	15	14	10	10	115	13	12	16	16	12	128	123
9	12	12	12	14	11	3	107	14	12	13	8	8	115	112
10	13	11	15	11	11	13	117	10	14	15	11	7	112	116
11	9	10	11	9	11	10	105	7	10	10	13	11	104	105
12	12	9	12	14	14	15	125	14	12	15	12	7	116	123
13	8	5	10	6	11	9	93	7	3	10	9	17	93	92
14	16	10	15	13	7	12	112	12	12	12	4	16	110	112
Deteriorated Unclassified Schizophrenia														
1	11	10	10	14	6	7	104	0	2	6	8	2	78	90
2	14	5	11	9	13	6	96	3	4	12	13	6	90	88
3	9	3	10	5	9	9	87	4	6	10	10	7	85	85
4	14	11	14	10	6	6	103	3	3	9	10	4	87	94
5	11	9	11	9	6	3	89	4	10	14	16	13	112	100
6	7	7	6	6	6	1	83	4	1	5	12	3	90	83
7	9	9	12	13	10	10	108	8	10	10	9	6	93	101

* The Bellevue Scale was not given to this case.

TABLE B.—BELLEVUE SCALE SUBTEST SCORES FOR ALL CASES (*continued*)

No.	Voc.	C	I	S	D	A	V. IQ	PA	PC	BD	OA	DS	P. IQ	Total IQ
							Acute Paranoid Schizophrenia							
1	10	7	11	11	13	6	105	9	6	9	4	12	86	95
2	14	11	15	13	9	15	121	8	14	9	8	5	108	116
3	12	7	9	11	6	10	98	8	9	13	5	10	106	102
4	11	7	11	14	9	12	107	12	14	14	11	8	111	110
5	16	13	15	11	7	12	114	11	9	9	12	9	106	111
6	12	11	12	14	9	12	116	7	7	8	12	9	107	112
7	9	12	8	11	9	4	98	4	6	12	12	9	100	100
8	11	14	12	14	10	13	121	7	3	8	9	12	103	113
9	12	11	11	17	6	9	112	11	10	14	7	6	113	115
10	11	13	12	9	7	13	110	9	9	12	8	7	103	107
11	13	10	13	8	9	9	103	10	14	10	9	9	108	106
							Chronic Paranoid Schizophrenia							
1	12	15	13	14	10	13	123	8	10	12	13	9	118	123
2	10	9	7	9	9	10	101	9	7	11	7	12	111	105
3	13	9	11	11	9	7	101	11	10	10	5	8	98	96
4	12	8	12	11	9	13	107	11	13	15	14	10	117	113
5	14	8	10	11	13	12	113	4	5	5	7	9	93	102
6	12	12	12	10	7	10	105	6	10	14	12	6	98	105
7	11	11	11	8	14	13	113	10	12	14	12	12	113	114
8	13	12	12	12	14	10	116	12	6	10	9	13	109	114
9	11	11	7	12	7	7	98	7	7	7	12	9	99	99
10	11	11	13	9	7	3	95	13	8	7	7	7	87	90
							Deteriorated Paranoid Schizophrenia							
1	16	12	17	12	7	7	110	10	13	10	15	8	114	113
2	10	11	13	13	10	10	115	5	8	15	12	10	115	116
3	13	12	10	8	10	9	107	7	12	11	9	10	114	112
4	11	10	10	6	2	3	85	6	9	7	5	7	97	90
5	8	4	4	9	9	9	86	6	7	9	10	10	96	90
							Paranoid Condition							
1	13	11	15	16	16	13	130	6	9	6	5	12	103	118
2	12	12	11	14	6	7	105	11	9	13	12	10	115	111
3	15	14	16	13	17	12	131	11	6	9	7	13	111	126
4	14	11	14	17	4	7	109	7	12	9	7	11	104	107
5	15	11	14	14	16	10	122	17	14	14	16	15	139	132
6	11	9	10	10	7	4	99	8	8	10	13	8	112	105
7	16	14	17	14	10	13	126	12	10	8	11	10	107	118
8	14	12	12	11	16	10	117	11	8	10	13	10	108	114
9	12	14	13	13	7	10	112	10	12	12	12	10	114	114
10	14	12	14	14	7	12	117	9	14	17	13	16	137	129
11	14	11	13	13	11	15	122	12	12	16	13	10	130	131
12	12	12	13	17	14	12	126	7	9	16	12	14	119	125
13*														
14	10	10	11	10	9	10	104	11	10	9	8	17	109	107

* The Bellevue Scale was not given to this case.

TABLE B.—BELLEVUE SCALE SUBTEST SCORES FOR ALL CASES (*continued*)

No.	Voc.	C	I	S	D	A	V. IQ	PA	PC	BD	OA	DS	P. IQ	Total IQ
Simple Schizophrenia														
1	14	15	15	10	11	13	120	11	13	15	10	12	117	120
2	9	9	11	7	7	6	92	9	10	10	12	11	102	97
3	10	11	12	11	6	7	100	8	9	8	12	8	92	96
4	8	12	9	12	9	1	97	11	7	12	12	6	100	98
5	14	12	13	11	10	12	113	11	8	13	15	10	108	112
6	11	11	11	11	11	17	118	12	12	11	14	11	112	118
7	8	10	11	10	10	10	105	7	10	13	11	11	102	104
8	8	7	11	4	6	6	84	6	9	8	13	13	96	89
9	6	5	6	6	6	4	75	10	3	6	5	9	76	73
Coarctated Preschizophrenia														
1	13	8	13	11	11	12	110	6	11	10	10	8	91	102
2	10	6	12	11	13	10	107	7	7	8	7	11	84	96
3	12	14	14	11	7	12	114	16	12	15	13	9	119	118
4	9	8	12	11	11	9	105	11	10	13	12	14	112	110
5	13	12	15	14	9	13	121	7	6	10	6	8	57	110
6	9	13	9	12	7	7	101	7	7	13	12	11	102	102
7	8	12	11	8	4	10	101	7	6	9	8	9	99	100
8	14	9	14	11	3	9	103	9	10	10	14	8	113	108
9	15	13	16	16	13	16	133	13	10	14	11	14	127	131
10	14	11	13	14	11	7	112	7	10	8	8	6	103	105
11	11	12	13	12	11	10	114	11	12	11	10	11	112	114
12	14	15	15	13	11	10	121	7	8	14	12	11	108	116
13	11	14	15	13	6	7	110	12	15	14	13	15	125	118
14	12	14	13	14	16	10	126	9	10	10	8	11	95	113
15	14	13	13	17	7	7	112	4	12	12	11	12	110	112
16	13	13	13	14	13	13	123	9	6	10	11	11	105	116
Over-Ideational Preschizophrenia														
1	14	10	10	15	9	12	111	11	13	14	9	17	121	117
2	15	15	16	17	16	13	138	15	14	16	14	11	126	135
3	14	12	16	15	10	15	124	13	12	13	15	12	119	124
4	14	9	13	11	13	10	113	12	13	13	12	10	113	116
5	13	14	16	17	9	13	128	9	13	13	12	12	111	121
6	14	13	13	16	13	10	122	12	10	9	11	12	114	119
7	15	15	15	14	13	15	130	15	10	13	8	11	118	125
8	13	12	12	10	9	12	110	7	9	10	10	12	96	104
9	15	13	15	16	13	13	128	8	13	13	11	12	121	126
10	17	12	14	13	9	13	117	7	13	16	12	11	114	117
11	15	12	15	15	11	15	126	10	9	13	7	10	104	117
12	14	14	13	14	14	12	124	11	12	12	12	12	117	123
13*														
14	14	16	15	17	16	17	144	15	14	15	13	15	129	142
15	16	13	17	15	14	13	130	14	15	17	12	16	139	137
16	13	14	15	15	14	17	134	14	14	16	15	12	135	137
17	14	13	11	13	9	13	115	6	7	9	12	10	98	108

* The Bellevue Scale was not given to this case.

TABLE B.—BELLEVUE SCALE SUBTEST SCORES FOR ALL CASES (*continued*)

No.	Voc.	C	I	S	D	A	V. IQ	PA	PC	BD	OA	DS	P. IQ	Total IQ
							Psychotic Depression							
1	9	11	9	8	7	4	97	3	4	1	2	4	74	85
2	8	4	10	5	0	9	87	3	2	0	0	0	67	72
3	11	9	10	12	6	7	98	6	0	8	0	0	65	82
4*														
5	12	6	13	11	0	10	99	6	6	5	9	7	96	99
6	12	10	11	5	7	7	102	4	7	5	7	3	106	99
7	8	6	3	8	9	6	89	6	0	5	4	6	82	85
8	10	5	9	11	11	9	98	11	7	7	4	10	92	95
9*														
10	12	12	10	14	10	9	110	12	7	8	12	14	110	111
							Involutional Depression							
1	12	14	11	12	7	6	109	6	5	8	13	7	103	109
2	15	11	12	8	6	12	108	7	10	4	8	6	98	106
3	12	13	9	9	4	7	101	8	7	7	6	6	97	101
4	15	11	13	8	9	15	115	6	8	10	13	8	108	115
5	11	11	11	8	11	3	103	6	8	5	4	1	85	96
6	5	6	0	10	7	1	83	3	2	3	9	4	82	80
7	9	6	10	10	6	10	101	3	3	7	2	4	79	92
							Severe Neurotic Depression							
1	11	10	11	13	7	7	104	13	8	8	6	10	106	105
2	10	8	7	11	7	6	98	8	6	5	10	5	97	99
3	14	12	13	15	9	12	120	7	12	11	7	9	111	118
4	10	11	13	11	11	13	118	9	8	7	7	9	104	115
5	11	10	11	10	7	12	105	8	8	7	12	7	99	103
6	15	16	16	15	16	13	135	8	13	12	12	14	126	133
7	8	9	8	14	2	10	97	7	8	6	6	3	84	91
8	10	6	9	11	9	10	98	8	9	10	6	6	92	95
9	10	10	10	8	9	12	108	7	8	9	8	7	103	108
							Neurotic Depression							
1	14	10	13	14	16	7	116	13	14	15	11	11	126	123
2	10	8	10	11	4	4	91	5	6	5	0	6	79	83
3	14	11	15	14	10	10	117	11	13	12	10	12	122	121
4	12	11	12	10	4	7	103	6	9	8	8	9	104	106
5	11	11	11	13	10	10	112	9	6	10	12	10	109	111
6	12	11	9	13	9	9	106	13	10	13	15	10	123	115
7	14	10	14	14	14	13	122	14	13	12	9	14	121	123

---

* The Bellevue Scale was not given to this case.

TABLE B.—BELLEVUE SCALE SUBTEST SCORES FOR ALL CASES *(continued)*

No.	Voc.	C	I	S	D	A	V. IQ	PA	PC	BD	OA	DS	P. IQ	Total IQ
							Hysteria							
1	14	14	15	16	6	17	127	12	10	15	14	12	130	134
2	10	9	11	13	10	10	109	10	14	12	12	11	123	117
3	14	9	13	11	10	10	108	12	10	9	7	6	98	104
4	13	14	13	11	16	12	123	9	6	9	8	10	96	111
5	12	11	10	14	4	6	98	13	8	10	6	9	101	100
6	15	12	13	15	14	12	123	16	13	14	12	14	128	127
7	9	11	9	12	6	12	104	14	10	15	14	14	122	114
8	12	12	13	11	11	10	113	9	9	11	10	6	92	103
9	10	10	11	10	9	10	104	11	10	9	8	17	109	107
10*														
11	13	14	12	13	13	13	122	13	9	12	12	11	118	122
12	13	15	10	14	11	13	119	11	10	14	10	13	113	118
13	11	9	10	10	6	7	98	3	6	3	4	9	86	91
14	13	12	10	14	10	13	115	11	10	13	12	9	115	117
15	12	15	14	15	11	9	120	13	10	14	11	12	116	119
16	14	13	13	14	7	13	116	11	12	13	11	17	124	121
17	14	12	14	14	10	13	120	14	10	12	8	13	115	119
18	9	13	10	8	4	9	100	14	7	9	7	10	100	100
19	12	11	8	11	7	9	99	11	13	12	12	11	114	107
							Anxiety and Depression							
1	14	11	13	17	13	13	124	11	13	11	9	13	115	121
2	13	12	12	13	11	12	116	10	13	13	8	11	112	115
3	13	14	13	14	11	13	123	11	9	12	12	12	119	123
4	13	11	15	12	7	9	110	14	14	14	7	13	124	118
5	14	16	15	14	10	13	126	10	9	10	11	14	114	123
6	14	16	15	14	11	12	127	11	9	11	11	7	114	125
7	13	16	13	16	9	15	127	11	9	9	11	10	109	119
8	16	16	16	14	9	9	123	14	12	12	7	11	124	126
9	13	14	12	16	7	6	110	13	9	7	9	10	100	105
10	11	12	11	13	9	12	112	14	9	12	13	11	117	116
							Mixed Neurosis							
1	12	16	15	16	11	9	124	11	9	14	7	17	116	122
2	14	11	13	15	10	13	119	11	10	14	10	10	115	119
3	14	13	15	11	11	13	119	8	13	12	11	13	112	117
4	9	12	7	11	7	9	99	11	10	12	16	11	116	107
5	13	16	14	15	10	12	126	8	12	11	8	13	118	125
6*														
7	12	12	12	14	6	3	100	11	9	10	10	13	106	103
8	9	11	10	11	7	10	102	11	12	14	12	12	117	110
9	12	12	13	14	14	9	118	9	7	6	9	12	93	107
10	13	11	14	15	9	10	120	11	14	14	15	8	124	120

* The Bellevue Scale was not given to this case.

TABLE B.—BELLEVUE SCALE SUBTEST SCORES FOR ALL CASES (*continued*)

No.	Voc.	C	I	S	D	A	V. IQ	PA	PC	BD	OA	DS	P. IQ	Total IQ
Obsessive-Compulsive Neurosis														
1	14	12	11	9	14	13	117	11	12	9	11	14	121	122
2	14	13	16	17	7	15	125	11	9	12	11	11	108	118
3	15	14	14	17	16	15	134	13	13	16	11	15	126	133
4	14	13	13	13	10	9	115	8	7	14	9	15	116	116
5	13	10	11	10	7	9	106	4	6	6	4	2	83	96
6	16	11	17	14	14	13	129	9	10	14	10	12	121	129
7	13	12	15	11	7	11	112	11	8	9	15	9	112	113
8	12	11	13	12	17	13	123	11	8	12	13	11	112	120
9	10	11	12	8	7	9	106	7	7	5	10	5	97	104
10	12	12	11	14	10	7	114	14	9	10	11	10	110	113
11	9	12	8	8	9	6	95	8	10	9	10	9	92	93
12*														
13	16	16	17	16	7	12	126	14	14	15	14	14	137	133
14	14	11	15	14	10	13	121	10	13	14	16	13	131	128
15	15	11	15	13	9	10	114	8	9	11	8	11	105	111
16	15	16	15	13	11	12	124	11	14	12	12	12	117	123
17	12	13	13	12	7	9	109	12	12	14	12	9	117	114
Neurasthenia														
1	11	11	12	12	10	13	115	8	10	9	4	11	103	110
2	13	11	13	14	9	12	115	8	8	7	8	11	99	108
3	10	13	13	6	9	12	109	6	7	7	7	8	98	104
4	8	12	8	11	7	10	110	10	10	13	10	10	109	110
5	13	11	12	14	9	9	114	5	10	9	9	14	112	116
6	10	6	9	11	9	10	98	8	9	10	6	6	92	95
Well-Adjusted Patrol														
1	10	10	12	11	9	10	107	9	14	11	11	13	116	112
2	13	11	14	12	9	15	117	10	13	11	12	10	110	115
3	14	13	14	10	11	15	120	12	15	14	12	13	129	126
4	12	12	9	11	7	6	101	6	12	10	12	10	112	106
5	14	13	11	11	11	12	115	8	13	12	15	12	124	120
6	11	13	11	11	10	10	113	6	10	9	12	12	114	114
7	12	11	13	12	10	10	113	10	12	9	8	9	110	112
8	14	11	14	13	13	9	116	14	14	14	16	10	131	125
9	10	11	10	7	7	10	98	9	8	10	10	12	104	102
10	10	13	12	12	9	12	114	9	8	12	12	9	106	111
11	14	14	15	14	16	12	131	11	12	12	12	7	123	129
12	13	11	13	12	14	12	119	11	10	11	10	13	115	117
13	10	11	11	12	9	10	110	5	10	8	7	8	101	106
14	13	13	14	14	9	10	115	14	12	9	4	11	102	110
15	12	13	14	13	17	12	127	12	10	16	4	10	115	123
16	15	15	16	14	16	15	134	13	14	14	10	14	122	131
17	14	16	15	13	9	17	128	14	15	13	11	12	125	129

* The Bellevue Scale was not given to this case.

TABLE B.—BELLEVUE SCALE SUBTEST SCORES FOR ALL CASES (*continued*)

No.	Voc.	C	I	S	D	A	V. IQ	PA	PC	BD	OA	DS	P. IQ	Total IQ
							Well-Adjusted Patrol—(*continued*)							
18	14	10	15	14	11	15	121	17	10	13	12	11	120	122
19	13	14	11	14	11	12	118	11	9	14	13	15	118	119
20	12	13	11	12	7	12	111	8	10	12	13	14	118	115
21	13	14	15	14	9	17	127	10	14	9	10	13	117	124
22	14	13	13	15	13	13	124	15	10	14	13	11	125	127
23	11	16	16	14	6	12	121	11	13	11	12	12	117	122
24	13	13	12	11	7	9	107	11	10	14	15	13	122	115
25	12	10	14	11	14	13	119	9	9	12	13	13	123	122
26	13	14	14	13	13	9	121	7	10	11	9	11	110	116
27	9	12	11	9	13	7	107	7	9	11	13	11	110	110
28	13	11	11	14	13	9	114	14	13	14	9	8	119	118
29	14	11	12	14	6	13	111	13	14	14	13	13	127	121
30	15	16	15	14	14	9	125	14	15	14	9	14	124	126
31	15	15	15	16	13	12	129	10	14	9	11	8	115	124
32	14	14	14	11	7	10	112	11	13	12	13	10	120	117
							Borderline-Adjusted Patrol							
1	13	11	13	11	9	10	109	8	12	11	9	8	103	107
2	9	13	11	10	9	13	111	11	10	11	7	12	107	110
3	14	13	13	12	10	10	113	15	9	14	15	14	125	120
4	10	7	7	7	4	10	88	7	12	11	12	13	115	102
5	9	14	8	8	7	10	101	14	10	4	6	8	96	98
6	14	11	14	11	14	12	118	7	8	10	7	11	97	109
7	13	12	13	12	16	10	120	11	14	10	13	11	120	122
8	13	15	13	13	13	10	120	9	12	16	13	11	117	120
9	13	11	12	11	6	7	103	6	9	12	5	10	103	103
10	10	10	10	11	9	12	107	9	10	10	9	12	109	109
11	9	11	9	9	9	7	101	7	8	11	4	11	102	101
12	10	11	11	12	7	6	101	7	8	10	11	11	102	102
13	12	11	13	12	13	7	111	8	9	10	12	14	110	111
14	14	13	14	11	14	13	122	8	8	10	7	10	100	113
15	12	13	12	11	16	17	126	13	9	9	7	13	104	117
16	10	14	11	12	17	17	129	8	10	7	7	10	92	112
17	14	15	15	15	11	12	126	13	15	15	14	12	130	130
							Maladjusted Patrol							
1	12	12	11	16	6	13	113	13	13	13	13	12	121	118
2	11	14	13	11	17	10	121	11	12	14	15	14	124	124
3	10	11	11	8	10	10	104	9	13	14	10	14	116	110
4	12	12	14	13	11	13	120	14	10	12	5	10	107	115
5	13	12	13	13	14	13	121	12	14	14	10	13	120	122

TABLE C.—BABCOCK TEST. AVERAGE SCORE ON EACH SUBTEST

Group	No. of Cases	Subtest									
		4	5	6	7	9	10	11	12	19	Vocab.
U Sch A	9	11.7	14.7	13.2	14.9	13.1	12.6	11.0	11.2	16.1	62.8
U Sch Ch	10	12.4	14.2	12.1	13.1	14.3	14.3	12.4	11.2	14.8	63.4
U Sch D	4	8.8	9.8	8.2	8.8	10.6	10.0	6.8	7.1	10.5	42.2
P Sch A	8	12.6	13.8	11.1	12.5	15.3	13.8	12.4	10.9	15.6	65.8
P Sch Ch	8	11.9	14.1	13.9	13.6	16.6	13.5	12.6	11.5	15.9	59.8
P Sch D	3	11.0	16.0	10.7	13.0	15.3	13.0	12.7	15.0	15.3	60.4
P Co	11	16.1	16.4	12.2	14.6	14.5	13.9	16.3	13.0	16.0	70.0
SS	4	15.5	15.8	15.2	12.8	11.8	13.5	14.8	16.2	14.2	55.6
Pr C	12	14.2	15.4	14.2	14.7	13.7	14.1	15.6	14.5	17.2	67.0
Pr O-I	11	16.1	17.0	15.3	16.9	15.9	14.6	18.5	17.1	16.7	70.6
DP	2	7.5	8.5	11.5	11.0	14.0	12.5	6.5	2.8	13.8	62.4
DI	3	11.7	9.5	12.7	11.3	13.3	9.3	11.7	5.7	16.0	65.4
DSN	8	12.9	12.8	12.1	14.0	13.1	12.1	11.6	10.2	15.4	57.0
DN	4	14.0	13.0	9.2	12.0	15.4	9.0	13.0	11.9	17.8	62.4
Hy	12	13.7	17.0	12.7	13.4	15.1	13.6	16.7	15.1	17.2	64.8
A & D	8	13.2	15.4	13.6	13.4	15.4	12.6	14.4	12.6	16.2	67.8
MN	7	15.7	15.1	12.7	13.4	16.6	13.7	17.0	14.6	17.4	67.2
O-C	9	16.0	16.2	14.3	13.9	15.3	12.9	16.2	14.5	17.6	71.0
Neuras	4	10.5	13.9	11.2	11.5	15.2	14.4	12.2	6.4	15.1	52.2
P (1)	32	14.3	16.3	12.7	14.1	15.0	14.4	16.2	13.8	16.7	65.2
P (2)	17	14.8	16.1	12.3	13.8	15.4	14.9	16.4	11.9	16.3	61.2
P (3)	5	14.6	16.5	12.6	14.6	16.0	14.8	18.0	16.3	16.2	61.0

TABLE D.—BABCOCK SUBTEST SCORES FOR ALL CASES

No.	Efficiency Scores							Subtest Scores											
	VA*	TD	LD		RD		MD	4	11	6	7	5	9	10	12	19	Voc.	E_I%	E_{II}%
			New	Old	New	Old													
Acute Unclassified Schizophrenia																			
1	11	−2.3	−4.5	−3.6	+1.8	+4.5	−2.8	7	5	15	11	8.5	14	5	5	18	19	186	180
5	16	−0.9	+2.5	+2.3	−5.5	−2.8	−1.0	17	18	8	11	17.5	14	12	16.5	17.5	31.5	18	22
6	15	−4.1	−6.0	−4.6	−5.2	−4.2	−0.3	9	8	7	10	14	15	15	8.5	11.5	27.5	100	100
7	19	−3.2	−6.0	−5.9	−2.5	−0.5	−0.3	12	8	11	16	15	13	19	5.5	19.5	38	50	125
8	19	−0.2	+0.5	+0.9	+0.5	+0.7	−1.3	15	18	14	19	16	15	13	18.5	17	38.5	33	39
11	14	−2.5	−3.5	−3.4	+2.2	+2.4	−3.3	10	10	14	15	15	10	9	5.5	15	25	100	70
12	17	−1.7	−4.4	−2.0	+0.7	+0.9	−2.5	11	11	17	15	15.5	10	15	16	16.5	35	63	163
16	15	−2.2	−6.0	−4.7	+5.8	+3.3	−1.8	11	6	19	20	14	11.5	14	8	12	28	127	383
18	20	−2.0	−2.5	−0.9	−0.8	0.0	−1.9	13	15	14	17	17	15.5	11.5	17.5	18	40.5	132	53
Chronic Unclassified Schizophrenia																			
2	15	−4.8	−8.5	−7.5	−3.7	−3.2	−2.0	8	4	9	11	7	16	16	9	11.5	27.5	63	300
3	14	−2.0	−2.0	−1.4	−1.8	−2.0	−0.8	16	7	13	8	12.5	12	16.5	13	10	26	75	271
7	18	−3.0	+1.0	−1.9	−4.6	−4.1	−2.3	14	20	10	12	15	14	12	7.5	12.5	37	70	70
8	18	−2.8	−4.0	−1.6	−6.6	−4.4	−1.3	13	11	7	11	16	13	15	17.5	15.5	36	69	82
9	17	−4.3	−4.9	−5.8	−2.3	−1.5	−3.7	8	13	14	12	14	14	9	3.5	15.5	34	200	100
10	17	−0.7	−2.9	−2.9	+1.2	+2.5	−0.7	12	13	20	13	14	16	16	11	20.5	33.5	33	62
11	15	−0.8	−3.0	−1.6	−0.2	+0.5	+2.2	11	12	11	16	17.5	18	16	11	15.5	29	118	75
12	15	−1.2	−2.5	−1.1	+3.8	+3.3	−4.0	11	13	17	18	15.0	9	9	14.5	16	29	100	147
13	13	−0.5	−1.0	−1.0	+0.7	−0.3	+1.7	12	12	10	16	15.5	17	15.5	8.5	10	22.5	83	192
14	20	−1.1	+2.5	+1.0	−4.3	−0.3	−0.8	19	19	10	14	15.5	14	18	16.5	21	43	0	11
Deteriorated Unclassified Schizophrenia																			
1	11	−4.3	−7.5	−3.9	−3.2	−1.9	−1.5	6	0	7	7	10	12.5	9	10.5	11	18	200	1500
3	12	−1.2	0.0	−1.6	+0.8	−1.7	+1.5	14	9	13	12	9.5	13	8	7	14	21	129	333
5	13	−4.0	−1.0	−1.9	−4.8	−4.8	−4.3	10	14	7	8	12	10	8	8.5	7.5	23.5	100	114
6	13	−6.2	−8.5	−8.2	−5.3	−4.5	−4.5	5	4	6	8	7.5	7	15	2.5	9.5	22	280	400

* Vocabulary Age.

TABLE D.—BABCOCK SUBTEST SCORES FOR ALL CASES (*continued*)

No.	Efficency Scores							Subtest Scores											
	VA	TD	LD		RD		MD	4	11	6	7	5	9	10	12	19	Voc.	$E_4\%$	$E_{11}\%$
			New	Old	New	Old													
	Acute Paranoid Schizophrenia																		
1	16	− .6	−3.0	−2.5	+1.5	+3.0	− .5	14	10	15	18	15	16	14	11	21	31	36	20
2	20	−5.8	−1.5	−5.0	−8.3	−6.0	−5.1	15	15	7	9	7.5	13	14	8.5	15	41	270	60
3	15	−2.7	−2.5	−1.4	−6.7	−4.4	+ .2	12	12	7	7	15.5	17	13	13	14	28.5	75	83
5	20	−1.0	+ .5	+ .8	+ .7	0	− .8	14	20	18	16	17.5	17	13	17.5	15	44	57	0
6	17	−3.3	−5.9	−4.6	−1.8	−1.3	−3.5	10	9	10	17	10.5	14	13	13.5	15	33	110	211
7	14	−2.9	−7.0	−5.0	− .8	− .5	+ .4	7	6	12	11	15	15	15	6	12.5	26.5	86	250
8	16	− .2	+2.0	+1.9	−3.5	−2.2	+ .8	17	17	10	11	17.5	15	16.5	14	17.5	32	53	47
9	15	−3.8	−3.5	−2.0	−2.2	−1.7	−1.3	12	10	10	11	12	15.5	12	3.5	15	27	133	120
	Chronic Paranoid Schizophrenia																		
1	16	−3.1	−10.0	−6.5	0	0	+ .3	6	4	14	16	14.5	17	16	9.5	15	30	67	200
3	17	−1.1	+1.1	− .9	−3.3	−1.3	−1.8	17	16	11	13	10.5	18	14	14.5	18	33.5	24	38
4	15	−1.2	−1.0	−1.9	−2.7	− .2	− .8	11	16	10	12	13.5	14.5	14.5	14	18.5	28	83	47
6	14	−4.7	−9.5	−8.6	−1.3	−1.3	− .4	4	4	13	9	11.5	15	16	0	11	26	125	400
7	15	+1.7	−2.0	+ .4	+5.3	+5.0	+3.0	13	12	19	19	19	19	16	15.5	18	27.5	31	133
8	17	+1.8	+2.6	+2.6	+5.2	+4.4	−1.0	17	19	21	20	17.5	18.5	9	18.5	18	34.5	24	37
9	18	−1.7	+2.5	+1.0	−5.1	−4.1	−1.1	16	21	9	12	17.5	15	12	13.5	13.5	30.5	19	0
10	15	−4.0	−4.5	−5.6	−2.7	−1.4	−3.2	11	9	14	8	9	16	10.5	6.5	15	29.5	73	122
	Deteriorated Paranoid Schizophrenia																		
1	20	−2.8	+ .5	+ .1	−6.3	−4.6	−1.1	15	19	12	8	16	15.5	15	16.5	15	44	20	36
3	16	−1.0	− .5	+ .9	−2.0	0	−2.8	16	13	10	16	16	15	7	18.5	19	30	38	16
5	11	− .9	−6.5	−2.0	+2.3	+2.1	+4.2	2	6	10	15	16	15.5	17	10	12	16.5	500	67

TABLE D.—Babcock Subtest Scores for All Cases *(continued)*

No.	Efficiency Scores							Subtest Scores											
	VA	TD	LD		RD		MD	4	11	6	7	5	9	10	12	19	Voc.	E_4%	E_{11}%
			New	Old	New	Old													
								Paranoid Condition											
1	17	−2.4	− .9	−1.6	+ .7	+ .7	−4.5	14	15	14	18	17.5	9	8	8.5	16	32.5	63	73
2	15	−1.2	+1.5	0	−4.2	−2.9	+1.5	16	16	9	10	16	14.5	19	10	13.5	29	54	54
3	20	+ .1	− .5	+ .1	+4.7	+4.7	−1.5	17	15	21	21	17	15	13	17.5	21	41.5	36	27
4	19	−3.2	−1.5	−1.7	−8.5	−5.8	−1.3	12	17	7	8	13	16.5	14.5	15	15.5	38	75	84
6	15	−3.6	+1.5	− .4	−6.7	−5.4	−2.8	16	16	7	7	15.5	10	11	9	11	29	75	75
7	20	+ .6	+4.0	+3.0	−1.3	− .3	+1.9	21	20	14	16	19.5	20	16	17.5	18	46	33	15
8	18	−1.3	−2.0	−2.2	+2.4	+1.2	−1.7	15	13	17	19	16	13	14	10	14.5	35.5	67	57
9	17	−1.5	+3.1	− .4	−3.8	−2.5	− .8	18	19	8	15	15	15	15.5	8	15.5	34	44	26
10	17	−1.2	+3.6	+ .9	−4.8	−3.0	−1.0	19	19	10	11	16	16	13	11	16	34.5	55	41
12	17	+1.6	−1.4	+1.1	+4.7	+3.5	+1.0	15	13	19	21	17	18	16	21	16.5	35	67	38
14	18	−1.6	−1.0	− .4	−4.1	−1.9	−1.5	14	16	8	15	17.5	13	13	15	18	30.5	86	38
								Simple Schizophrenia											
4	13	− .2	−1.0	+ .2	+1.2	+1.4	−1.1	11	13	14	13	11.5	9	16	17.5	14	24	36	62
5	20	−2.2	−2.5	−2.4	− .3	+ .3	−1.3	15	13	17	15	16	15	15	12.5	18	39	20	31
7	13	+ .8	+7.0	+6.1	+2.2	+2.0	−1.5	20	20	16	13	17.5	13	8	19	14	22.5	0	15
8	14	− .3	+1.0	+2.3	− .3	− .6	− .3	16	13	14	10	18	10	15	16	11	25.5	42	92

TABLE D.—Babcock Subtest Scores for All Cases *(continued)*

No.	Efficiency Scores							Subtest Scores											
	VA	TD	LD		RD		MD	4	11	6	7	5	9	10	12	19	Voc.	E_I%	E_{II}%
			New	Old	New	Old													
								Coarctated Preschizophrenia											
1	16	−1.9	−2.0	−1.6	− .5	+ .3	−3.3	12	14	14	15	13.5	9	13	14	17	30.5	92	29
2	13	+1.9	−1.0	+ .9	+5.2	+4.9	+1.4	12	12	18	17	16	12	19	15.5	16.5	24	50	83
3	15	−1.2	+4.0	+1.9	−4.2	−2.5	−1.5	17	20	7	12	15.5	13	12	13	14.5	28.5	59	5
5	17	−1.7	−2.9	−4.0	+4.2	+4.0	−3.3	11	14	20	19	15	11	12	5.5	19	35	154	63
8	17	−4.5	−1.9	−4.1	−8.8	−5.3	−3.0	14	13	6	7	12	12	15	6	17	35	35	80
9	20	+ .7	+3.0	+2.8	+2.7	+2.7	+ .6	20	19	20	18	19	15	14	19	19	41	15	16
10	20	−2.9	+1.5	− .4	−3.8	−2.0	−4.8	17	19	14	11	12.5	16	7	16	18	39.5	54	42
11	15	+ .2	−3.5	− .5	+4.3	+3.0	+ .7	9	13	18	18	16	17	14	18	14	29.5	89	131
13	16	− .7	+ .5	+2.1	−3.0	−1.3	−1.0	17	14	11	13	19.5	12	12	18	17	33	118	70
14	17	+1.4	+ .1	+1.2	+3.2	+2.4	+ .8	13	18	18	19	16.5	17	17	19	16	33.5	100	17
15	18	− .1	+1.5	+1.1	−3.1	− .8	− .5	17	18	13	12	16.5	15	15	17	19.5	37	59	17
16	18	−1.5	−3.5	−3.5	−2.1	− .4	− .2	12	13	11	16	12.5	16	19	12.5	18.5	35.5	58	46
								Over-Ideational Preschizophrenia											
1	17	+1.1	+5.1	+4.5	−1.3	−1.6	0	21	20	13	15	19	14.5	14.5	19.5	16	32.5	10	10
2	17	+1.4	+2.1	+1.6	+2.7	+3.0	0	17	18	19	17	16	18	14	17	19	35	41	56
3	18	+ .4	+3.0	+3.1	−3.6	−1.1	− .8	19	19	11	13	17.5	14	14	21	19.5	36.5	42	10
5	16	− .2	0	+1.4	−2.5	−1.7	+1.5	10	20	10	15	19	17	15	16.5	15	30	80	20
6	17	+ .9	+2.1	+1.4	+2.2	+2.5	+ .5	18	17	18	17	19.5	17	13	12.5	18.5	34	55	36
9	18	+ .6	+ .5	+ .6	− .1	+ .9	+ .2	14	19	11	20	15	17.5	16	18.5	18.5	37	135	95
11	20	− .2	− .5	−1.4	+5.2	+4.2	−1.8	13	19	22	21	12	17	15.5	16.5	18.5	42	24	21
12	19	− .8	−2.5	−2.5	+2.0	+2.0	0	12	15	19	17	16	17	15	11	8	38.5	33	33
14	20	+2.1	+3.5	+3.1	+5.2	+4.0	+2.1	21	19	21	22	20	18	18	18.5	18	41	19	32
16	15	+2.0	+4.5	+4.3	+1.3	+1.3	− .7	20	18	14	16	17	14	12	20	15	27.5	15	12
17	17	−1.4	+ .1	−1.8	−3.8	−1.8	−2.2	12	19	10	13	16.5	11	14	17	17.5	34.5	83	16

TABLE D.—BABCOCK SUBTEST SCORES FOR ALL CASES (*continued*)

No.	Efficiency Scores							Subtest Scores											
	VA	TD	LD		RD		MD	4	11	6	7	5	9	10	12	19	Voc.	$E_{I}\%$	$E_{II}\%$
			New	Old	New	Old													
Psychotic Depression																			
5	18	−5.6	−6.0	−7.2	−4.6	−4.6	−4.2	9	11	10	12	9.5	15	11	5.5	11	36.5	0	18
7	14	−4.9	−9.5	−9.6	− .8	+ .9	−3.1	6	2	13	10	7.5	13	14	0	16.5	26	233	550
Involutional Depression																			
1	17	−3.9	−2.9	−3.5	−3.8	−2.3	−4.8	12	13	10	13	12.5	14	7	10	16	34.5	58	54
4	17	−3.6	−2.4	−5.3	−3.3	−2.0	−2.8	12	14	14	10	10.5	16	13	4	16	34	125	56
5	15	−5.4	−5.0	−7.6	−1.2	0	−7.2	11	8	14	11	5.5	10	8	3	16	29.5	100	188
Severe Neurotic Depression																			
1	15	− .8	+1.0	+ .9	−1.7	− .2	− .8	14	17	11	13	16.5	14	12	14	16.5	28	43	6
2	15	−3.5	−2.0	−4.2	−2.7	−1.2	−3.3	13	12	10	12	10	16	9	6	15.5	28.5	100	108
3	17	−2.4	−6.4	−3.3	−1.8	− .6	−1.3	7	11	10	17	16	14	14	14.5	17	35	114	91
4	14	+ .7	+4.0	+1.6	+3.2	+3.2	−1.4	18	17	18	13	14.5	13	12	11	15.5	27	11	54
5	14	−3.7	−4.0	−5.0	−3.3	−1.6	−2.1	11	8	8	10	10.5	13	14	4.5	14	27	27	63
6	19	+2.5	+3.5	+3.0	+5.0	+4.3	+1.2	20	19	22	20	18.5	16	17	18.5	19	38	35	32
7	13	−4.8	−5.0	−5.5	−2.3	− .5	−7.8	11	5	8	12	7.5	5	7	6.5	15.5	24	100	460
8	12	−3.4	−5.0	−4.4	+1.2	+ .5	− .3	9	4	10	15	9	14	12	6.5	10.5	20.5	22	150
Neurotic Depression																			
2	14	−3.5	−5.0	−5.1	−2.3	− .6	−2.6	8	9	9	11	10	14	12	6.5	15	26.5	125	111
4	14	−4.4	−4.5	−5.3	−4.8	−2.3	−2.8	10	8	7	8	11.5	15	9	2.5	15	26.5	100	375
6	16	−1.1	+1.5	+1.1	−3.5	−1.0	−3.3	18	15	10	13	13	16.5	7	18.5	19	31	50	73
7	20	− .6	+3.5	+2.9	−2.8	0	−2.6	20	20	11	16	17.5	16.5	8	20	22	41	45	35

TABLE D.—Babcock Subtest Scores for All Cases *(continued)*

No.	Efficiency Scores							Subtest Scores											
	VA	TD	LD		RD		MD	4	11	6	7	5	9	10	12	19	Voc.	E_I%	E_{II}%
			New	Old	New	Old													
								Hysteria											
1	18	− .1	−1.0	+ .3	− .1	+ .2	0	11	19	14	17	17	17	14	18	16.5	37	145	42
2	14	+1.7	+3.0	+3.6	+4.2	+3.5	− .9	17	16	18	15	16	15	10	19.5	14.5	24.5	30	31
4	17	+ .6	− .4	+1.9	−4.3	−1.0	+2.7	13	17	11	11	20.5	18.5	17	18.5	21	33	31	36
5	17	−2.5	−1.4	−2.3	−6.3	−3.6	− .7	13	15	10	8	14	12	20	10.5	17	32.5	70	53
6	19	+ .3	+4.0	+3.1	− .5	+1.0	−2.5	19	21	15	16	18	13	9.5	18.5	20	38	65	14
7	14	+ .3	+1.0	+2.0	−2.8	− .3	+1.4	12	17	8	11	17.5	13.5	17	15.5	17	25.5	133	30
9	18	−1.6	−1.0	− .4	−4.1	−1.9	−1.5	14	16	8	15	17.5	13	13	15	18	30.5	86	38
11	20	−2.0	+1.0	− .5	+1.2	+1.9	−4.8	16	19	18	17	15.5	13	7	13.5	19.5	40.5	25	21
12	17	− .9	+ .1	0	−1.9	−1.3	0	14	17	14	13	17	17	14	13.5	15	33.5	70	53
15	17	−1.2	−2.9	− .3	−3.3	−2.3	+ .5	11	13	11	13	17.5	17	15	19	15	33.5	55	8
16	17	−1.7	−2.9	−2.5	−1.3	− .3	+ .3	12	13	16	12	18.5	16	14.5	8	17	33.5	133	84
19	15	−1.1	+ .5	− .2	−2.2	− .7	0	13	17	10	13	15.5	16.5	13	11.5	16	27.5	72	42
								Anxiety and Depression											
2	16	−2.2	−1.0	−1.6	−4.0	−2.7	− .4	12	16	11	11	16.5	15	14	9	15	30	50	25
3	17	+1.5	+ .1	+ .9	+4.2	+4.5	0	15	16	19	20	17	15	16	17	20.5	34	60	0
5	18	+ .1	− .5	− .7	+1.1	+1.4	+ .7	17	14	17	18	17	19	14	13	16	35.5	88	100
6	17	−5.1	−5.4	−5.0	−3.8	−2.6	−7.3	9	11	10	13	9.5	9.5	7	12	15	34.5	44	100
7	18	−2.0	−1.0	−1.2	−4.1	−2.6	−1.7	15	15	11	12	15	14	14	14	16	35.5	73	47
8	20	−4.7	−5.0	−5.5	−4.3	−2.8	−1.6	11	12	13	11	15	16	14	6	16.5	40.5	55	117
9	17	−1.7	− .9	− .3	−5.8	−3.6	− .4	13	16	11	8	16.5	18	13	15	16	34	77	0
10	15	− .3	0	+ .8	+1.8	+1.5	− .7	14	15	17	14	17	17	9	15	14.5	27.5	93	53

TABLE D.—BABCOCK SUBTEST SCORES FOR ALL CASES (*continued*)

No.	Efficiency Scores							Subtest Scores											
	VA	TD	LD		RD		MD	4	11	6	7	5	9	10	12	19	Voc.	E_4%	E_{11}%
			New	Old	New	Old													
								Mixed Neurosis											
1	17	+1.0	+ .6	+1.4	+ .7	+1.2	+1.7	15	17	17	15	18.5	19	15.5	16.5	17.5	33	40	18
2	17	+1.0	+3.1	+2.4	+ .7	+2.0	−1.2	17	20	14	18	16	15	13.5	18	20	35	42	20
3	18	+ .3	+2.0	+ .5	+1.9	+2.7	−2.5	17	19	19	16	14.5	16	10	15.5	20	36.5	24	21
5	17	− .7	+1.6	+ .1	−2.8	−2.3	+ .3	16	18	11	14	14	18	17	14	14	35	12	22
7	16	−3.6	−2.5	−1.9	−2.3	−5.2	−1.8	14	11	7	8	16	13	12	11.5	14.5	31.5	50	145
9	15	− .9	+1.5	− .9	−2.2	0	+ .5	14	18	13	10	15.5	18	13	7	18	28	57	22
10	18	−1.1	+ .5	−0.1	−2.5	−2.6	−1.7	17	16	8	13	11	17	15	19.5	18	36	0	19
								Obsessive-Compulsive Neurosis											
2	19	−3.2	−1.0	− .6	−9.0	−6.0	−1.3	15	15	7	7	17	15	12	14.5	16	37.5	20	60
3	18	+2.3	+ .5	+ .5	+5.4	+5.4	+2.3	17	16	20	22	19	19	17	14	21	35.5	41	75
4	20	+ .2	+1.0	+1.6	− .8	+ .7	+1.6	18	17	14	17	19.5	19	16	18	20	40.5	44	24
5	17	−4.7	−3.9	−6.3	−4.3	−2.5	−5.5	14	9	14	8	6.5	12	13	7	16.5	35	43	189
8	16	+1.3	+4.0	+3.4	+2.0	+3.2	−2.3	17	21	21	13	16.5	15	8	19	20.5	31.5	30	14
11	14	−1.1	+1.0	−1.1	−1.0	+ .5	− .9	14	15	10	13	13	15	13	7.5	16	26	71	93
14	20	− .4	+1.5	+1.3	+ .7	+ .7	− .4	18	18	17	17	17.5	17	14	17.5	17	44	22	11
15	19	+ .2	+3.0	+1.9	−2.0	− .8	+1.3	19	19	16	12	20	16.5	15.5	13.5	17.5	37.5	21	15
17	16	−1.9	−1.0	+1.0	−2.0	−1.7	−4.3	12	16	10	16	16.5	9	8	19.5	14	32	58	44
								Neurasthenia											
1	14	+1.6	+3.5	+3.0	+ .7	+1.2	+1.9	18	16	14	12	16	16	17.5	16	14.5	26.5	22	18
3	14	−3.4	−5.5	−6.0	− .8	+ .5	−2.1	8	8	11	12	10.5	13.5	13.5	3.5	15.5	25	150	150
4	12	−2.3	−2.0	−3.1	− .8	+1.2	+1.3	11	8	10	11	11.5	15	13.5	3	16.5	21.5	27	88
5	16	−3.5	−3.5	−4.1	−4.5	−3.3	+ .2	6	17	10	11	17.5	16.5	13	3	14	31	367	30

TABLE D.—Babcock Subtest Scores for All Cases (*continued*)

No.	Efficiency Scores							Subtest Scores											
	VA	TD	LD		RD		MD	4	11	6	7	5	9	10	12	19	Voc.	$E_4\%$	$E_{11}\%$
			New	Old	New	Old													
Well-Adjusted Patrol																			
1	16	+ .4	−1.0	− .5	+2.5	+2.7	+ .5	12	16	19	16	16	16	16	14	18	30	92	63
2	17	−3.2	+7.4	−3.9	−2.3	−1.5	−2.2	9	7	10	16	15.5	12	14	14.5	15.5	35	22	143
3	17	−1.2	− .9	+ .2	−2.8	−2.3	− .3	11	18	9	16	17	15	15	16.5	14	34.5	100	56
4	14	− .6	−2.0	− .5	−1.8	− .5	+1.7	8	15	10	11	16	17	16	13	14.5	25	38	13
5	16	− .2	0	+ .3	+1.0	+1.3	− .5	13	17	17	15	17	15	13	14	17	30	77	35
6	15	−2.3	+2.0	+ .3	−5.2	−4.0	−1.2	16	17	7	10	15.5	16	10	10.5	12	27.5	50	42
7	17	−3.2	−1.9	−2.6	−1.3	−4.1	−2.0	11	16	18	10	13	15	14	11	15.5	34	73	69
8	18	+ .3	+4.5	+1.0	− .1	+ .2	0	20	21	15	16	17	17	14	10	16.5	36	40	0
9	15	−2.1	−4.0	− .6	−4.2	−3.5	+ .8	8	13	8	11	17.5	15	15	17	11.5	29	150	77
10	15	−1.3	+ .5	+ .8	−4.7	−2.2	− .5	14	16	7	11	15.5	13	15	15.5	16.5	29	57	50
11	19	− .7	+1.5	− .9	+2.5	+2.3	−2.2	15	20	21	16	15.5	14	12	10	18	38.5	7	5
12	18	− .4	+ .5	−1.6	+2.4	+2.1	− .2	15	18	18	18	17.5	16	14	7	17	35.5	100	0
13	14	−2.3	− .5	−2.0	−1.8	−1.5	− .4	9	13	8	10	15.5	13	14	8.5	14.5	27	100	38
14	16	−1.1	+2.5	+2.1	−6.0	−4.3	− .7	17	18	8	10	15.5	14	15	18	14	30	65	44
15	15	+3.0	+1.5	+2.4	+7.3	+6.6	+1.7	18	14	22	20	16	17	17	19.5	19	28.5	50	50
16	16	+ .3	+2.5	+2.3	−2.5	− .7	+ .3	17	18	10	15	16.5	17	14	17.5	18	32	24	17
17	20	+ .5	+3.0	+2.3	+2.7	+3.2	−1.4	21	18	20	18	17.5	15	13	18.5	20.5	42	28	39
18	18	−2.4	+1.0	−1.6	−6.1	−4.1	− .3	15	19	8	11	16	14	17	7.5	15.5	35.5	27	11
19	16	+1.2	0	+1.8	+1.0	+1.7	+1.8	15	15	15	17	18	17	17	19	18	31	53	40
20	14	−1.2	−1.5	−1.1	+1.2	+ .5	+ .4	12	12	11	16	18	14	13	7.5	11.5	27	16	175
21	18	+ .6	− .5	+ .6	+ .4	+ .7	+1.3	14	17	14	18	18	17	17	17.5	17	35	29	24
22	19	−1.3	− .5	+ .5	−4.5	−2.2	−1.2	15	16	10	13	16.5	16	12	19	18.5	37.5	40	38
23	14	+ .9	+3.0	+2.6	−1.3	+2.0	− .3	16	17	11	11	16	12	15	15.5	21	27	6	0
24	16	−1.2	− .5	−1.1	−4.5	−2.0	+1.7	13	16	11	10	17.5	17	17	9	18	32	84	25
25	18	+ .2	+1.0	− .2	+ .4	+1.2	+ .3	17	17	14	18	17	16	16	12.5	18.5	36	24	0
26	18	− .4	− .5	+ .4	−1.1	− .1	−1.5	16	15	11	18	15.5	14	14	19	17.5	36.5	31	60
27	14	+ .7	+ .5	+2.1	− .8	+1.4	+ .6	11	17	10	13	16.5	13	16	18	18	25	63	24
28	17	−1.5	− .4	−2.2	− .3	+1.3	−2.0	16	14	14	16	16	13	13	7	20	34.5	38	43
29	17	+1.1	+3.6	+3.4	−2.3	− .8	+1.1	18	20	14	12	17.5	17	17	19	17.5	33.5	17	0
30	19	− .6	−1.0	+ .5	−1.0	+ .3	−1.3	16	14	14	16	17	16	11	19	19	37.5	38	114
31	17	−2.2	+1.6	−2.4	−1.8	− .6	−3.0	17	17	13	14	13	13	13	5	17	33.5	36	60
32	19	−2.9	−2.5	−1.0	−6.0	−3.5	−2.7	14	18	10	10	15	14	11	13	16.5	38	71	50

TABLE D.—BABCOCK SUBTEST SCORES FOR ALL CASES (*continued*)

No.	Efficiency Scores							Subtest Scores											
	VA	TD	LD		RD		MD	4	11	6	7	5	9	10	12	19	Voc.	E_4%	E_{11}%
			New	Old	New	Old													
Borderline-Adjusted Patrol																			
1	16	−2.7	+ .5	−2.0	−5.0	−3.3	−1.2	15	16	7	13	15	15	13	6	15	30	147	63
2	14	0	0	+ .9	−3.3	− .8	+2.1	10	17	7	11	16	17	17	14.5	16.5	26	70	35
3	20	−2.2	−1.5	−1.4	−2.3	− .3	−1.8	14	16	11	17	16.5	15	13	14	20	40	64	44
4	15	−2.4	+1.0	−1.6	−3.7	−2.0	−2.2	15	16	9	11	11.5	17	10	9	15	28	47	30
5	14	−2.3	−2.5	−1.2	−5.3	−3.3	− .6	12	14	6	8	13	14	15	10	13	27	83	36
6	18	−1.2	+1.0	+ .5	−1.1	−1.3	−2.0	15	19	11	18	18	13	11	14	14	36	80	11
7	16	+1.7	+4.0	+ .4	+4.5	+4.0	+2.3	21	17	19	20	17.5	18	18	6	18	32	33	18
8	16	+1.5	+3.5	+2.5	+ .5	+ .7	+2.3	18	19	14	17	17.5	16	20	15.5	16	30	44	32
9	18	− .9	+2.0	−1.0	−5.1	−2.3	+1.5	16	20	10	11	16.5	17	19	7.5	19	35.5	75	15
10	15	−1.7	−1.5	−1.4	−1.2	− .4	0	12	14	13	12	18	17	10	8.5	15	29	50	36
11	14	+ .1	0	+1.8	−2.8	−1.3	+2.2	12	15	9	10	17.5	17	16	16.5	14	26	83	13
12	14	+ .1	+ .5	+ .3	+1.7	+2.4	− .6	13	15	14	14	14	14	14	13	16	26.5	62	47
13	15	+ .9	+2.5	+1.8	+2.8	+2.0	+1.5	18	16	15	18	18	15	16.5	13	14	27.5	72	38
14	18	− .4	+1.0	− .5	− .1	+2.6	−1.0	18	16	18	13	15	14	16	13	17.5	36.5	39	50
15	14	− .4	−1.0	+ .6	−1.3	+ .2	+ .4	8	17	11	11	17	13	15	14.5	15.5	27	163	0
16	15	+1.1	+2.0	+ .8	+6.8	+6.6	−1.8	16	17	23	18	16.5	11	12	11.5	20	29	31	18
17	17	0	+1.1	+1.5	−2.3	−2.1	+1.2	19	14	12	12	16.5	18	17	15.5	18	33.5	30	35
Maladjusted Patrol																			
1	16	+ .2	+3.5	+1.9	−3.0	−1.3	+ .8	17	20	13	11	16	16	17	15.5	17	30.5	18	30
2	17	+1.5	+1.6	+1.0	+4.2	+3.7	+ .2	14	20	19	20	15.5	17	16	16	18	33	43	35
3	15	0	+ .5	+2.5	−2.2	−2.4	+2.2	14	16	10	13	18.5	17	16	19.5	11	28	29	63
4	16	−2.3	−3.0	−1.2	−4.5	−2.7	−1.2	9	15	10	11	16	14	13	15	16	30.5	78	47
5	16	+ .7	+4.0	+2.5	− .5	+1.0	− .7	19	19	11	18	16.5	16	12	15.5	19	30.5	16	0

TABLE E.—SORTING TEST SCORES: GROUP AVERAGES

Group	No. of Cases	Part I																							Part II: Verbalization													
		Sorting									Verbalization																											
		+	±	∓	−	L	(L)	l	N	(N)	+	±	∓	−	CD	FD	C	S	S/N	Fab	Ch	Symb	F	M	+	±	∓	−	CD	FD	C	S	S/N	Fab	Ch	Symb	F	M
U Sch A	8	4.1	.5	.4	1.6	1.1	.6	.5	.9	1.5	4.3	.4	.4	2	3.6	1	1	.2	.3	.3		.1	.4	.1	7.8	.8	.3	3.3	7.4	.9	.2	2.1	.6	.1			.4	.4
U Sch Ch	10	3	.9	.6	2.5	1.2	.9	.4	1.4	1.3	2.6	.8	.5	3.1	2.6	.8	1.8	.2	.15	.35	.2		.45	.5	7.3	.7	.5	3.5	7.3	.7	.25	2.9	.25	.1			.15	.4
U Sch D	4	2.3	1.2	5	3.5	1.5	.5	1.0	2.3	1.5	2	.25	1	3.8	2	.25	.9		.25	1.1		1.0	.25	1.25	2.3	1.0	.5	8.3	2.3	.8	.6	4.3	.1	1.0			1.0	2.0
P Sch A	8	4.5	.9	.3	1.4	.6	.8	.4	1	2.9	3.5	.9	.3	2.4	3.1	.9	1.6	.9		.1			.1	.3	5.4	1.9		4.8	5.2	1.3	1.3	2.0	.8	.25		.2	.4	.8
P Sch Ch	8	3.4	1	.1	2.5	1.1	1.3	1.0	1.3	2.3	3	.4	.3	3.4	2.6	.8	1.3	.1		1.5			.4	.4	6.8	.9	.4	4.0	6.5	.9	.1	1.3	.9	1.3		.1	.4	.6
P Sch D	3	3.3	1.3	.3	2		.7	1.3	2.3	1.3	2.3	1.7	.3	2.7	2.3	1	.7	.2	.3	.2			.7	1.7	6.0	2.7	.3	3.0	6.3	1.2	1.0	.3	.5			.5	.8	1.3
S S	7	3.6	1.1	0	2.3	.1	.6	1.0	1.4	1.3	3.3	1.3		2.4	2	1.9	1.6		.1				.1	1.3	7.4	1.3	.3	3.0	6.8	1.4	.4	.9	.9				.1	1.4
P Co	13	3.5	.8	.2	1.5	.2	.5	.5	1.6	1.8	4	1.1		1.9	3.5	1	1.2	.2		.2	.1		.3	.6	8.2	.7	.1	3.1	7.9	.7	.1	1.3	.3				1.0	.9
Pr C	11	4.1	.8	.5	1.6	.5	.3	.7	.7	2.6	3.9	1	.4	1.7	3.4	1.2	1	.4	.2		.2		.1	.5	8.2	1.1		2.7	8.0	.9	.1	1.4	.6	.3			.4	.5
Pr O-I	12	3.5	1	.7	1.8	.8	.6	1.0	1.1	1.1	4.1	.7	.6	1.7	3.4	1.3	.8	.4	.1				.4	.5	8.6	.6	.2	2.6	8.3	.6	.2	1.8	.3	.3		.1	.3	.2
DP+DI	7	4.7	.4		1.9			0	2.3	2.4	4.0	.3		2.7	2.6	2.1	1.8	.1	.1				.1	1.1	5.7	1.0	.1	5.1	5.0	1.3	.5	.9	1.6	.9			.2	1.6
DSN+DN	13	3.5	.9	.3	2.3	.6	.6	.5	2.9	1.4	3.0	.9	.3	2.8	2.5	1.3	1.3	.1	.1	.16			.2	1.2	6.9	.7		4.5	6.0	1.2	.4	1.5	.8	.1			.5	1.5
Hy	15	4.7	1.1	.3	.9	.2	.8	.6	1.6	1.7	4.7	.7	.1	1.5	4.5	.6	.5	.4		.2	.1		.3	.5	9.1	.3		2.6	8.8	.5	.1	.9	.8				.1	.7
A & D	8	4.1	.8	.5	1.6	.4	.5	.5	2.6	1.8	3	1.1	.5	2.4	2.7	1.1	1.5	.1	.1	.1	.1		.3	1.1	8.0	.3	.1	3.6	7.6	.5		1.2	.6			.1	.3	1.8
MN	6	4	.5	.2	2.3	.2	.5	.2	1.8	1.5	3.3	.5	.5	2.5	3.3	.6	2.3	.2					.3	.4	7.5	1.5	.2	2.8	7.7	.8		2.2	.5				.4	.5
O-C	12	4.7	1.2	.2	1	.3	.7	.6	1.0	2.1	5.1	.5	.3	1.1	4.3	1.2	.5	.3		.2			.1	.3	8.4	1.1	.2	2.3	8.0	1.0	.1	1.2	.7				.1	.9
Neuras	5	4.6	.4	.2	1.8		.2	.6	2.6	1.4	3.4	.6	.2	2.8	2.7	1.1	1.6		.2	.3			.3	.8	5.0	1.6		5.4	4.8	1.0	.7	1.1	1.2	.1			.3	2.8
P (1)	32	4.5	.8	.3	1.4	.2	.4	.7	1.3	2.6	4.1	.7	.2	2.0	3.6	1.0	1.4	.2		.1			.2	.6	8.9	.8	.1	2.2	8.8	.7	.1	.8	.5				.5	.6
P (2)	17	4.2	1.1	.2	1.5	.2	.6	.8	1.2	2.2	3.8	.9	.2	2.0	3.3	1.1	1.1	.2	.2	.1			.2	.7	8.4	.6	.1	2.9	8.1	.7	.3	1.2	.7	.1			.4	.6
P (3)	5	3.4	1.4	.8	1.4	.8	1.2	1.0	.6	2.4	3.0	1.8	.4	1.8	3.7	.4	1.7	.3	.4	.1			.4		8.2	.6		3.2	8.0	.5	.1	1.7	.9				.2	.6

TABLE F.—SORTING TEST:

PART I

No.	Grouping									Verbalization													
	+	±	∓	−	L	(L)	l	N	(N)	+	±	∓	−	CD	FD	C	S	S/N	Fab	Ch	Symb	F	M
Acute Unclassified Schizophrenia																							
1	5	2				1	1		5	5	1	1		1.5	4.5	.5	.5						
5	5		2		1	1			1	7				7									
6	6	1					1	1	1	7				6	1								
7				7	7							1	6	.5		2.5		1.5	2.5				
8	4	1	1	1	1	3			2	4	1	1	1	5			1				1		
11	4			3				2	2	2			5	2		3						2	
17	5	1		1			1	3		4			3	2	2	2						1	
18	4	2		1			1	1	1	5	1		1	5	.5			.5					1
Chronic Unclassified Schizophrenia																							
2	3	1		3	1			1	2	2	2		3	2	1	2.5						1.5	
3	1			6	2	2				1			6	1		4				2			
6	3	1		3	2		1	2		3			4	2	1	1	1		2				
7	3	2	1	1	1	1	2		1	3	2		2	3	1	.5		.5	1			1	
8	5			2				2	3	3			4	3		3							1
9	2		1	4	1			3	2	1	1		5	1	.5	2		.5					3
10	2	3	1	1		3	1	3		3	2	1	1	4.5		2	.5						
11	3	2		2		2		2	3	2	1		4	1	2.5	1						1.5	1
12	7							1		7				7									
14	1		3	3	5	1			2	1		4	2	1.5	1.5	2	.5	.5	.5			.5	
Deteriorated Unclassified Schizophrenia																							
3	2			5	4	1		1	1	2			5	.5		1.5		1	4				
4	2			5				5	2			2	5	1		2						1	3
5	2	3		2	2	1	2		2	2	1	2	2	3	.5						3.5		
6	3	2		2			2	3	1	4			3	3.5	.5				.5		.5		2
Acute Paranoid Schizophrenia																							
1	5	1		1			1	1	5	6			1	4	2								1
2	7							4	2	6			1	5	1	1							
3	3	1	1	2		3			4	3			4	3		2	1.5					.5	
5	3	1		3	3	1			2	2	2	1	2	3.5			3.5						
6	4	1	1	1	1	1		1	4	2	2	1	2	3.5		3.5							
7	5	1		1			1	1	4	2			5	2		2	2						1
8	3	2		2	1	1	1	1	4	2	2		3		3	2.5			1			.5	
9	6			1					1	5	1		1	4	1.5	1.5							

Scores of Individual Cases

Part II

No.	Verbalization													
	+	±	∓	−	CD	FD	C	S	S/N	Fab	Ch	Symb	F	M
							Acute Unclassified Schizophrenia							
1	6		1	5	4	2.5	1.5	2.5	1.5					
5	9		1	2	9.5			2.5						
6	6	1		5	5.5	1		2.5	3					
7	7	2		3	7.5	.5		2.5		.5			1	
8	8	2		2	8.5	.5		.5					1.5	1
11	7			5	7			3						2
17	7	1		4	5.5	2		3.5					1	
18	12				11.5	.5								
							Chronic Unclassified Schizophrenia							
2	8	2		2	9		1	.5	.5					1
3	7			5	6	1.5		4.5						
6	8	1		3	8	.5		3.5						
7	8			4	7	1	1	.5	.5	1				1
8	11	1			12									
9	1		3	8	2			9					1	
10	6	1	1	4	7			3	.5				.5	1
11	9			3	7	2		3						
12	8			4	8			3						1
14	7	2	1	2	6.5	2	.5	2	1					
							Deteriorated Unclassified Schizophrenia							
3	1	1		10	1	.5		7		3			5	
4	4	1	2	5	4	1.5		2					1.5	3
5	2	1		9	2	.5	.5	6.5		1			.5	1
6	2	1		9	2	.5	2	1.5	.5				1.5	4
							Acute Paranoid Schizophrenia							
1	5			7	4	1		1	1				1	4
2	8	1		3	8	.5	.5		1					2
3	1	2		9	1.5	.5	4	3	1	.5		1.5		
5	6	5		1	7	2.5		2.5						
6	8	1		3	8.5			2.5	1					
7	5			7	3	2		6					1	
8	3	2		7	1.5	2.5	3.5	1	1.5	1.5			.5	
9	7	4		1	8	1	2		.5				.5	

TABLE F.—SORTING TEST:

PART I

No.	Grouping									Verbalization													
	+	±	∓	−	L	(L)	l	N	(N)	+	±	∓	−	CD	FD	C	S	S/N	Fab	Ch	Symb	F	M
Chronic Paranoid Schizophrenia																							
1	2	3		2		1	3		2	4	1		2	3.5	1	1.5						1	
2	6			1				5	1	4			3	4		2						1	
3	3			4				1	3	3			4	2	1				1				3
4	7							1	5	5			2	5		1						1	
7				7	7								7						7				
8	3	2		2	1		2	1	2	1	2		4	2		2.5			2			.5	
9	4	2		1			2	1	4	6			1	3	3	1							
10	2	1	1	3	1	1	1	1	1	1		2	4	1	1	2	1		2				
Deteriorated Paranoid Schizophrenia																							
1	4	2		1		1	2		1	1	4	1	1	3.5		2	.5	.5	.5				
3	2	2	1	2		1	2	2	1	4	1		2	3.5	1			.5					2
5	4			3				5	2	2			5		2							2	3
Paranoid Condition																							
1	4	1		2		1		2	2	1	3		3	.5	2	3	1.5						
2	5			2	1			2		5			2	5								1	1
3	6			1				1	4	6			1	6									1
4	5			2				3	3	5			2	4	1								2
5	7							1	3	7				6.5	.5								
6	1	1	1	4	1		1	1	1	3			4		3	2						1	1
7	4	3					3		3	5	2			3	3	1							
8	3	2		2	1	1	1			5			2	4	1	1.5						.5	
9	6			1				4		3	1		3	3.5		2.5							1
10	5	1	1			1	1			3	3		1	3.5	1	1		.5				1	
11	4			3				4	2	2			5	1	1	3							2
12	6	1					1	3	2	6	1			6.5		.5							
14	2	2	1	2		5			4	1	4		2	2	1	.5	.5		2	1			
Simple Schizophrenia																							
2	5			2				2	3	3	1		3	1.5	2	2.5							1
3	2	3		2			3		1	5			2	2	3	1							1
4	2	3		2		1	2			1	3		3	1.5	1	4		.5					
5	3	1		3	1		1	2	2	3	1		3	1.5	2	1						.5	2
6	4			3		3			2	6			1	3	3								1
7	3	1		3			1	3	1	3	1		3	3	.5	.5							3
8	6			1				3		2	3		2	1.5	2	2		.5					1

SCORES OF INDIVIDUAL CASES (*continued*)

PART II

No.	Verbalization													
	+	±	∓	−	CD	FD	C	S	S/N	Fab	Ch	Symb	F	M
							Chronic Paranoid Schizophrenia							
1	8	2		2	9			.5	.5					2
2	11			1	10	1								
3	9		1	2	7.5	2		1.5	1					1
4	10	1		1	10.5				1				.5	
7	1			11	1					9			2	
8	7	2		3	7.5	1	.5	1	1				1	
9	4	1		7	2	2.5	2.5		3					2
10	4	1	2	5	4.5	1		4.5	.5	1		.5		
							Deteriorated Paranoid Schizophrenia							
1	3	7	1	1	7		1.5	1	.5			1.5	.5	
3	9			3	8	1			1				1	1
5	6	1		5	4	2.5	1.5						1	3
							Paranoid Condition							
1	5	1		6	3.5	2		3	1			.5	2	
2	6			6	6		.5	3	.5				1	1
3	10			2	10								1	1
4	6			6	6			2					1	3
5	10			2	9.5	.5		1						1
6	8			4	7	1		.5	.5				1	2
7	10	2			10	1		.5	.5				1.5	
8	7			5	5	2		1.5	.5				1	2
9	10	1		1	10.5		.5	.5					.5	
10	8	1		3	8	.5	.5	1					1	1
11	7	2		3	7.5	1		1.5	.5				1.5	
12	10		1	1	9.5	1		.5					1	
14	9	2		1	10			1.5	.5					
							Simple Schizophrenia							
2	7	1		4	6	1.5	.5		3					1
3	5			7	3	2		4						3
4	11	1			10	1.5	.5							
5	12				11	1								
6	7	2		3	6	2	.5		2.5					1
7	7	1		4	7.5		.5							4
8	3	4	2	3	4	2	1	2	1				1	1

TABLE F.—Sorting Test:

Part I

No.	Grouping									Verbalization													
	+	±	∓	−	L	(L)	I	N	(N)	+	±	∓	−	CD	FD	C	S	S/N	Fab	Ch	Symb	F	M
Coarctated Preschizophrenia																							
1	5	1		1			1		3	5			2	1.5	3.5	1	.5					.5	
2	5	1		1			1	1	3	6			1	4	2								1
3	5		1	1		1		1	4	5		1	1	5.5			.5						1
4	3			4				4	2	2		1	4	2	.5	1.5							3
5	4		1	2	3				3	5		2		6			1						
8	4	1		2			1		4	4	1		2		4.5	1		.5				1	
11	3	1	2	1		2			1	2	3		2	3.5		2	.5			1			
13	2	1	1	3	2		2			1	3		3	2	.5	1.5	1	1		1			
14	5	1		1			1		3	5			2	5		2							
15	4	2		1	1		1	1	2	3	3		1	3.5	1	1	.5	1					
16	5	1		1			1	1	4	5	1		1	4.5	1	.5							1
Over-Ideational Preschizophrenia																							
2	3		1	3			1	3		4		3		3	2.5								1.5
3	4	3				2	1		2	5	2			5	1	.5		.5					
4	3	2		2	2	1	1			5			2	4	1		.5					.5	1
6	5			2				4	2	4			3	3	1	1							2
7	3	1		3		2	1	1	2	4			3	2.5	1.5	.5	.5					1	1
10	3		2	2	2	1		2		1	3	1	2	3		1	1					1	1
11	3	1		3	1		1	1		4			3	2	2	2						1	
12	2	1	3	1	1	1	2		2	4	1	1	1	2	3	1		.5			.5		
14	5			2	1				3	5			2	5		1	1						
15	5	1		1			1	1	2	4	1		2	2	2.5	1.5	1						
16	2	3	2		2		3	1		4	1	2		4.5	1		.5					1	
17	4	1		2	1		1			5			2	5		1	.5					.5	
Psychotic Depression																							
5	6			1				2	4	5			2	4	1	1							1
7	6			1				2	4	4			3	2	2	2.5						.5	
10	4			3				2	2	3			4	2	1	3							1
Involutional Depression																							
1	5			2				2	2	5			2	4	1								2
4	3	2		2			2	2	1	5			2	4	1								2
5	4	1		2			1	2	2	4	1		2	1.5	3	1.5							1
7	5			2				4	2	2	1		4	1.5	1	3	.5						1

SCORES OF INDIVIDUAL CASES (*continued*)

PART II

No.	Verbalization													
	+	±	∓	−	CD	FD	C	S	S/N	Fab	Ch	Symb	F	M
							Coarctated Preschizophrenia							
1	9	1		2	7.5	2		1	.5				1	
2	10	1		1	9.5	1		1					.5	
3	9			3	8.5	1		2					.5	
4	6			6	5	1		1	1					4
5	9	1		2	10			1					1	
8	6	1		5	3.5	3		1	1	2.5			1	
11	5	2		5	5.5	.5	.5	4.5	1					
13	9	3			9.5	1	.5	.5	.5					
14	11			1	11									1
15	8	1		3	8.5			3.5						
16	8	2		2	9				2.5	.5				
							Over-Ideational Preschizophrenia							
2	10			2	8.5	1.5		2						
3	10			2	9	1	.5	1.5						
4	9	3			10.5		.5	1						
6	8			4	8			2	1					1
7	10			2	9.5	.5		2						
10	3	2	1	6	3	1.5	.5	4		2				
11	6		1	5	5	1		3.5					2.5	
12	10			2	10			2						
14	12				12									
15	10	2			9.5	1.5	.5		.5					
16	5	1		6	5	.5		2	1.5	1		1		1
17	10			2	10			1					1	
							Psychotic Depression							
5	5			7	3	2	1	3	2					1
7	4	1	1	6	4	1	.5						.5	6
10	7	1		4	6	1.5	.5		4					
							Involutional Depression							
1	9			3	7	2		.5	2				.5	
4	6	1		5	6.5				2.5					3
5	2	2		8	2	1	1	.5	1	6.5				
7	7	2		3	6.5	1.5	.5	2					.5	1

TABLE F.—Sorting Test:

Part I

No.	Grouping									Verbalization													
	+	±	∓	−	L	(L)	1	N	(N)	+	±	∓	−	CD	FD	C	S	S/N	Fab	Ch	Symb	F	M
Severe Neurotic Depression																							
1	5			2	1			3	3	4			3	4		1		1					1
2	5	1		1			1	3	2	5			2	2	3	1							1
4	3			4				6	1	2			5	1	1	1						1	3
5	4			3				2	3	3	1		3	.5	3	2.5							1
6		2	1	4	3	4					3	2	2	2	1.5	.5		.5	2			.5	
8	4			3				7		1			6	1		3							3
Neurotic Depression																							
1	3	2		2	2	1	1		1	5			2	5.5	.5							1	
2	5	1		1			1	2	3	5	1		1	3	2.5	.5							1
3	4			3				6	1	2	1		4	1.5	1	1	.5						3
4	3		1	3			1	4	2	3			4	2	1	1							8
5	2	2	2	1	2	1	1	1		1	3	2	1	3.5		3	.5						
6	4	1		2			1	1	1	5			2	3.5	1.5	2							
7	3	3		1		2	1	3	1	3	3		1	2.5	2	1	.5					1	
Hysteria																							
1	6			1		1		2	1	5			2	5		1	1						
3	5			2				1		5			2	5								1	1
4	4	1	1	1	1		1	2	3	1	3	1	2	2.5	1.5	1.5						.5	1
5	6	1					1	3	1	6			1	5.5	.5	1							
6	4	3				2	1		3	5	1		1	3	2.5			.5				1	
7	6				1			2	2	6			1	6									1
8	6	1					1		1	6	1			6.5		.5							
9	2	2	1	2		5			3	1	4	1	1	2.5	1	1	.5		2				
11	4			3	2			2	2	4		1	2	4.5			1					.5	1
12	6			1				3	4	6			1	5	1								1
14	6			1				2	1	6			1	5	1								1
15	2	3	2			3	1		1	3	1		3	3.5		.5	2		1				
16	4	2		1			1	2	1	4	1		2	3	1.5		.5					1	1
18	5	1		1			1	3	2	4	1		2	4.5		2	.5						
19	4	3				1	2	2	1	6			1	6								1	
Anxiety & Depression																							
2	4			3				1	3	4			3	3	1	2						1	
3	4			3				4	2	2		1	4	2.5		3							1.5
5	6			1					1	6			1	5.5	.5	1							
7	2	2		3		1	1	3	1	1	1		4	1	.5	4.5							1
9	3	1	1	2	1	2		1		3	2	2		4.5	.5	.5	1					.5	
10	5			2				2	2	4			3	3	1	3							

Scores of Individual Cases (*continued*)

Part II

No.	Verbalization													
	+	±	∓	−	CD	FD	C	S	S/N	Fab	Ch	Symb	F	M
							Severe Neurotic Depression							
1	6			6	4	2		3.5					1.5	1
2	4	1		7	2.5	2	.5	2	1					4
4	3	1		8	2	1.5	3		.5	1			1	3
5	8	2		2	7	2			.5				1.5	1
6	12				11.5	.5								
8	3	1		8	2.5	1		7.5					1	
							Neurotic Depression							
1	10			2	10			2						
2	3	1		8	1	2.5	1	.5	3					4
3	9	1		2	8.5	1	.5	.5					.5	1
4	3	1		8	2.5	1			3.5					5
5	7	1		4	7.5		.5	.5	2				.5	1
6	12				12									
7	9			3	7	2		3						
							Hysteria							
1	11			1	11			.5					.5	
3	7			5	7			1	2	.5			.5	1
4	10			2	8	2		1	1					
5	9			3	9				3					
6	12				11	1								
7	8			4	6	2		2						2
8	11	1			10.5	1			.5					
9	9	2		1	10			1.5	.5					
11	9			3	8.5	.5		1						2
12	9			3	9				2					1
14	8			4	8		1							3
15	9	1		2	9.5			.5	2					
16	10			2	9.5	.5		2						
18	8			4	8		1	1	1					1
19	7			5	7			3	.5			.5		1
							Anxiety & Depression							
2	10	1		1	9.5	1		1.5						
3	8	1		3	8.5			3.5						
5	8			4	8			3	1					
7	6			6	4	2		.5	1.5				1	3
9	3	5	1	3	5	1		4	.5				1.5	
10	10	2			11	.5		.5						

TABLE F.—SORTING TEST:

PART I

No.	Grouping									Verbalization													
	+	±	∓	−	L	(L)	l	N	(N)	+	±	∓	−	CD	FD	C	S	S/N	Fab	Ch	Symb	F	M
										Mixed Neurosis													
1	7							5		4		1	2	1	3.5	2	.5						
2	2			5				5	1	1			6		1	2							4
3	4	1	1	1	1		1	1	3	3	2	1	1	2.5	2	.5			.5			.5	1
5	3	1		3		1		2	1	3		1	3	3.5		1					.5		2
7	5	1		1		1		2	3	5	1		1	5.5				.5					1
8	1	2	3	1	2	3		1			4	1	2	1.5	1	3						1.5	
9	5	1		1				2	3	4	2		1	4	1	.5	.5						1
10	6			1				3	3	4			3	3.5	.5	3							
										Obsessive-Compulsion													
2	3	3		1		1	2		1	5	1		1	3.5	2	1		.5					
3	6	1						1	6	6			1	3	3								1
4	3	3		1		3	1			6		1		6	.5		.5						
5	2	1	1	3	1	2	1	1	1	1	1	1	4	2		2	.5		2			.5	
6	3	2	1	1	1		2	1	1	4	1	1	1	3.5	1.5	.5						.5	1
8	6			1				2	1	5	1		1	4.5	1	.5	.5					.5	
9	4	1		2		1		4	2	5			2	2	3								2
10	5	2					1	1	3	6	1			5.5	1	.5							
11	5			2	1				3	4		1	2	4.5			2.5						
13	7								4	6	1			6.5		.5							
16	6			1				1	2	6			1	4.5	1.5	1							
17	6	1				1		1	1	7				6.5	.5								
										Neurasthenia													
1	6			1			1	1	3	6			1	5	1	1							
2	4		1	2		1		3	1	3	1		3	2	1.5	1.5			.5			1.5	
3	4			3				5		2			5		2	2							3
4	6			1				2	3	5			2	4	1	1							1
5	3	2		2			2	2		1	2	1	3	2.5		2.5		1	1				

Scores of Individual Cases (*continued*)

Part II

No.	Verbalization													
	+	±	∓	−	CD	FD	C	S	S/N	Fab	Ch	Symb	F	M
							Mixed Neurosis							
1	10		1	1	8.5	2		.5						1
2	6			6	5	1								6
3	9	1		2	9.5				2				.5	
5	8			4	8			1	1					2
7	7			5	7			2.5	1			.5		1
8	11			1	11								1	
9	8			4	7	1		2						2
10	5	1		6	5			3.5	1				.5	2
							Obsessive-Compulsion							
2	9	3			10.5			.5	1					
3	8	2		2	9.5			1	.5					1
4	9	1		2	9.5			.5						2
5	9	1		2	7	2.5		.5	1.5	.5				
6	9	1		2	8	1.5		.5	1					1
8	7	1		4	6.5	1	.5	4						
9	4			8	1	3		2					1	5
10	10	1		1	9.5	1		.5	.5				.5	
11	6		2	4	5	1		2	3					1
13	10	1		1	10.5		.5							1
16	9	1		2	7.5	2		2.5						
17	11	1			11.5				.5					
							Neurasthenia							
1	6			6	5	1		.5					.5	5
2	4			8	2.5	1.5		2	2					4
3	3	5		4	3.5	2	1.5	.5	1.5	.5			.5	2
4	6	1		5	6.5			2					.5	3
5	6	2		4	6.5	.5	2	.5	2.5					

TABLE F.—SORTING TEST:

PART I

No.	Grouping									Verbalization													
	+	±	∓	−	L	(L)	I	N	(N)	+	±	∓	−	CD	FD	C	S	S/N	Fab	Ch	Symb	F	M
Well-Adjusted Patrol																							
1	4	1		2		1		4	2	3		1	3	1.5	2	1.5							2
2	4	1		2	2	1		1	1	3	1		3	3	1	1	.5		.5			1	
3	5			2				2	3	4			3	3	1	2							1
4	6			1			1		3	5			2	4	1.5	1.5							
5	3	1		3			3	1	3	2	2		3	3		2						1	1
6	3	3		1				1	3	6			1	5	1								1
7	6			1					5	5			2	3.5	1.5	1						1	
8	5			2				3	4	3			4	2	1	1						1	2
9	6			1				2	3	4	1		2	4	.5	2.5							
10	5	1		1		1		1	4	4	2		1	4	1	.5				.5			1
11	5			2				2	4	2	1		4	1.5	1	3						.5	1
12	4	2		1			2		1	4	2		1	3.5	1.5	2							
13	2	2	1	2		1	2	2	1	3	2		2	3.5	.5	1						1	1
14	6			1				1	2	6			1	5.5	.5								1
15	2	1	3	1	2	2		1	2	3	1		3	3.5			2					.5	1
16	5	1		1			1	1	2	5	1		1	4.5	1	1.5							
17	4	1	1	1		1	1			5		1	1	5.5		1.5							
18	4	2		1			2	1	3	5	1		1	5.5		1	.5						
19	3		1	3		1		3	2		2	1	4		1.5	3.5							2
20	6			1				4	2	6			1	2	4	1							
21	3	2	1	1		2	1		2	2	1		4	2	.5	2	1.5		1				
22	6			1					3	6			1	6		1							
23	3	1		3	1		1		3	4		1	2	1.5	3	1.5	.5					.5	
24	5	2					2	3	1	5			2	5		2							
25	4			3				5	1	1			6		1	3			1				2
26	7								6	7				7									
27	3	2	1	1		1	2		3	4	1		2	4.5		2	.5						
28	2	3		2		1	2	1	4	3	1	1	2	2	2	1.5	.5						1
29	7								5	5	2			5	1	1							
30	6			1					1	6			1	6		1							
31	5	1		1			1	2	4	4	2		1	3	2.5	.5							1
32	6			1				1	1	6			1	5	1	1							

Scores of Individual Cases (*continued*)

Part II

No.	Verbalization													
	+	±	∓	−	CD	FD	C	S	S/N	Fab	Ch	Symb	F	M
	Well-Adjusted Patrol													
1	10			2	9.5	.5								2
2	11			1	11									1
3	11	1			10.5	1	.5							
4	8			4	7	1		2					1	1
5	9	2		1	9.5	.5			.5				.5	1
6	6	1		5	4.5	2		1	1.5					3
7	4	1		7	3.5	1	1.5	1	1.5				2.5	1
8	8			4	8			1					2	1
9	7	3		2	8	.5	1	.5	1					1
10	5	2		5	6			3.5	1.5	.5			.5	
11	10	1		1	9.5	1			1.5					
12	8			4	10				2					
13	3	3		6	4.5			4	.5				2	1
14	9	2		1	9	1		.5	.5					1
15	9	1		2	10								1	1
16	11			1	10	1		1						
17	10			2	10			1.5					.5	
18	9			3	9			3						
19	11			1	10	1								1
20	9		1	2	6.5	2.5		2.5	.5					
21	12				11	1								
22	9	2	1		10.5			.5	.5				.5	
23	8	1		3	7	1.5		1	1				1.5	
24	8	2		2	9				2				1	
25	11	1			10.5	1							.5	
26	10			2	10								1	1
27	9			3	8.5	.5		.5					.5	2
28	8	1	2	1	9.5		.5	1					1	
29	9			3	8	1		2					1	
30	12				12									
31	12				10	2								
32	10	1		1	9.5	1			1				.5	

TABLE F.—SORTING TEST:

PART I

No.	Grouping									Verbalization													
	+	±	∓	−	L	(L)	l	N	(N)	+	±	∓	−	CD	FD	C	S	S/N	Fab	Ch	Symb	F	M
	Borderline-Adjusted Patrol																						
1	5		1	1					2	2	3		2	3	.5	2		1.5					
2	5			2		1		2	3	3			4	1	2	3						1	
3	5			2				2	3	4	1		2	3.5	1				.5				2
4	6			1				2	3	6			1	3.5	2.5	1							
5	4	2		1	1		2		1	5	1	1		4	2			.5				.5	
6	2	4		1	2	1	2	1	1	2	3		2	3.5		2.5	.5					.5	
7	4			3				4	3	3			4	3		1							3
8	4	2		1			2		3	6			1	5	1	1							
9	5	1		1			1	1	2	6			1	5	1								1
10	3	2	1	1		2	1	1	1	3	3		1	3.5	1	.5	1						1
11	3	2	1	1	1		2	2	2	4			3	3.5	.5	1						1	1
12	5	1		1			1	3	2	4		1	2	4	.5	1.5							1
13	5			2		1			2	3		1	2	2	2	3							
14	3	1		3		2		2	2	2	2		3	2	1				1			1	2
15	6			1				1	4	6			1	2.5	3.5								1
16	4	1		2		2			1	3	1		3	3.5		1	2	.5					
17	3	3		1		1	2		3	3	2		2	3.5	.5	2		.5		.5			
	Maladjusted Patrol																						
1	3	3		1		1	2	1	1	4	1	1	1	4	1	1.5		.5					
2	4	2		1			2		4	3	3		1	3.5	1	2.5							
3	3		3	1	1	2		1	2	1	3		3	2.5		3.5	.5	.5					
4	3		1	3	2	1		1	2	2	1	1	3	3		1		.5	.5			2	
5	4	2		1	1	1	1		3	5	1		1	5.5			1	.5					

Scores of Individual Cases *(continued)*

Part II

No.	Verbalization													
	+	±	∓	−	CD	FD	C	S	S/N	Fab	Ch	Symb	F	M
Borderline-Adjusted Patrol														
1	8	2		2	8.5	.5	1		2					
2	8			4	7	1		.5	1				2.5	
3	5	2		5	6		.5		1	1.5			1	2
4	11			1	8.5	2.5							1	
5	8			4	6.5	1.5		4						
6	12				12									
7	12				11	1								
8	8	1		3	8.5			2	.5					1
9	9			3	9								1	2
10	11			1	11			1						
11	5	1		6	5	.5	1	4.5						1
12	7	2		3	7.5	.5	.5		2.5					1
13	8			4	6.5	1.5		2	1					1
14	4	2	1	5	6		1	3	2					
15	10	1		1	8	2.5	.5							1
16	8			4	7	1		3					1	
17	9			3	9				2					1
Maladjusted Patrol														
1	7	1		4	7	.5		2	2.5					
2	7			5	6	1		3	1					1
3	10	1		1	9.5	1	.5	.5	.5					
4	9	1		2	9.5				.5				1	1
5	8			4	8			3						1

Appendix III

REVIEW OF THE LITERATURE ON THE TESTS TREATED IN THIS VOLUME

A. REVIEW OF THE LITERATURE ON "SCATTER"

By Martin Mayman

The diagnostic significance of the variability in an individual's intelligence test subtest scores, termed "scatter", has been described in the body of this volume. Here we shall sketch the history of "scatter".

Publications dealt with in previous reviews will be treated through these reviews, and will be omitted from our bibliography. For these, the bibliographies of the publications listed under "Bibliographical Sources" may be consulted.

Scatter may be defined as unevenness in the level of attainment on different tests. For example, scatter can be observed in a test like the Stanford-Binet in the distribution of successes and failures on different age levels, or it can be observed by comparing the score on a reading achievement test with the score on an arithmetic achievement test.

The literature on scatter may be divided into three groups of studies: (1) scatter on the Stanford-Binet Intelligence Test, (2) scatter in inter-test comparisons, (3) scatter on the Wechsler Bellevue Intelligence Scale.[1]

1. *Scatter on the Stanford-Binet Intelligence Test*

The pertinent studies will be treated from the point of view of their results concerning: (a) amount of scatter, (b) selective scatter, (c) psychological rationale of scatter.

a. *Amount of Scatter*. In their review of the literature up to 1937, Harris and Shakow (18) summarize nine numerical measures of the amount of scatter. These were of three main kinds.

(1) Range of scatter: number of age levels from the basal level to the level where all items are failed.

(2) Area of scatter: the number of items passed or failed between the basal level and the level where all items are failed.

(3) Range and area of scatter: weighting of the number of successes and failures on each level by the distance of that level from the mental age; e.g., Pressey multiplies failures below and passes above the mental age by the number of year-levels separating each test from the mental age.

Harris and Shakow (18, 19) point out the frequent occurrence of contradictory findings, and discuss the reasons for these contradictions; they discuss the limitations of each of these measures. They conclude: "Research up to now has failed to demonstrate clearly any valid clinical use for numerical measures of scatter". Nevertheless, they state that, given a scatter rating above certain critical limits, "the existence of pathology might be considered probable" (19, p. 108).

In 1938, Malamud and Palmer (30) found that a group with organic pathology and a group of schizophrenics had significantly greater scatter, according to all three kinds of measures described above, than did a group with subnormal intelligence. The groups had been equated for mental age. All scatter measures used correlated positively with each other and with a measure of the discrepancy between Vocabulary mental age and Stanford-Binet mental age.

---

[1] The literature pertaining to the Babcock Mental Efficiency Test will be reviewed in Appendix III-B.

In 1940, Kendig and Richmond (23) found that, with mental age held constant, the average scatter of their dementia praecox group was greater than that of their mental defectives or normal controls, "but hardly sufficiently higher to be clinically significant" (23, p. 80). They too stated that in individual cases of dementia praecox the scatter may be unusually great.

Brody in 1942 (11) indicated that the critical limits set by Harris and Shakow for significance of a scatter score on the 1916 revision of the test were too low for the 1937 revision, but that the significance of his results was too uncertain to justify the selection of new critical levels. Trapp and James (46) and Worchel (52) found no significant change in amount of scatter with either greater deterioration or recovery.

In 1944, Hunt and Cofer (20, p. 984) presented a brief review of the literature, and concluded that "the scatter approach appears now to be a blind alley".

Thus, we may summarize: numerical measures of scatter on the Stanford-Binet have proved to be virtually useless as aids in clinical diagnosis; nevertheless, the clinical impression that the extent of scatter on the Stanford-Binet may be indicative of maladjustment persisted.

b. *Selective Scatter*. A more systematic approach attempted to determine the effects of specific psychiatric disorders on the ability to pass specific kinds of items. The significant studies are reviewed by Kendig and Richmond (23), Roe and Shakow (41), and Brody (10).[2] More recent pertinent studies are Piotrowski (32), Roe and Shakow (41), Myers and Gifford (31).

These studies dealt mainly with schizophrenics. There is some agreement in their findings to the effect that schizophrenics are less proficient than normals or non-psychotic clinical cases on the following items: detecting absurdities, interpretation of fables, ball and field test, drawing designs from memory, and problem questions. They are more proficient in arithmetical reasoning. With respect to none of these items, however, is there unanimous agreement. Furthermore, some contradictory findings were reported; several studies claimed that schizophrenics are worse than normals in repetition of digits, vocabulary, finding differences between abstract words, and making inductions, while others reported the reverse. Finally, on more than 15 other items schizophrenics seemed to show significant impairment in one or two studies, but not in the others. According to the reviewers, this essential lack of agreement is caused by inadequate control of variables: (1) inadequate control groups; (2) no control of mental age; (3) no control of chronological age; (4) no control of types of schizophrenia tested; (5) no statements about accessibility of the subjects. We may add the following: (1) divergent techniques of analysis; (2) techniques too crude to uncover important trends in the data. Findings in organic disorders, mental deficiency, manic-depressive psychosis, alcoholic disorders, etc., are also reported (10, 41), and were no more conclusive than the findings in schizophrenia.

The studies reviewed all agree that schizophrenia entails selective impairment of proficiency on test items; however, there is little agreement, and less conclusive proof, as to the items which show specific impairment.

---

[2] The more important studies reviewed were those by Pressey (35), Wells and Kelley (50), Barnes (3), Wentworth (51), Altman and Shakow (2), Malamud and Palmer (30).

c. *Psychological Rationale of Findings.* The rationale of a test item is a statement concerning the psychological function or functions which are tapped by that item. Even if we should observe that specific psychiatric disorders affect the ability to pass specific items, these observations—to be diagnostically useful—must still be interpreted in terms of impairment of specific psychological functions.

Test rationale, for the most part, has not been explicitly formulated by investigators. Rather, it is embedded in their inferences regarding the nature of impairment in specific psychiatric disorders, mostly schizophrenia and organic disorders. Only studies dealing with schizophrenia will be considered here.

One group of investigators explains failures as due to impairment of "attention and effort", mental "control", or "volition". [See (20), (23), (33) and (50).] These generalizations are of little practical clinical use.

Another group of investigations refers to the loss of specific but broad capacities (see 20). The various capacities referred to include: (a) the capacity to generalize and think conceptually, reflected in similarities, defining abstract words, interpretation of fables, and sentence construction (39, 51, 13); (b) judgment, reflected in comprehension, interpretation of fables, detecting absurdities, ball and field, problem questions (51, 30, 39, 13); (c) ability to understand motives underlying social acts, reflected in interpretation of fables, comprehension, absurdities (51); (d) visual discrimination and visual recognition, reflected in copying a diamond, drawing designs from memory (39, 13, 32); (e) memory and recall, reflected in repetition of digits, repetition of syllables (sentences), drawing designs from memory, reading and report of a paragraph (13, 31).

Several writers recognize that impairment on "memory" tests refers, to some extent at least, to a weakness of attention. Myers and Gifford (31) indicate that not all "memory" tests measure the same thing. They state that their findings "cut directly across traditional psychological categories in that, while 'memory' for word meanings, sentences and digits remains relatively unimpaired, 'memory' for stories and designs is seriously reduced." (31, p. 100).

Systematic classification of the test items in terms of rationale were made by Wells (49, p. 53), Kendig and Richmond (23, p. 54), and Roe and Shakow (41, p. 377). Wells sets up his categories as follows: *speed* (60 words, dissected sentences, arithmetic, problems of enclosed boxes); *vocabulary*; *memory* (repetition of digits, repetition of syllables, reading and report); *imagery* (memory for design, problem of enclosed boxes); *comparisons* (similarities, differences); *reasoning* (arithmetic, induction); *comprehension*; *practical judgment* (ball and field); *ideational judgment* (absurdities, interpretation of fables, problems); *sensation* (comparison of weights); *perception of form* (copying a square or diamond). Kendig and Richmond's categories are: *mainly eductive* (vocabulary, comprehension, problems, and abstraction) in all of which "g" is supposed to play the dominant rôle; *mainly non-eductive* (memory, visual imagery, orientation) in all of which factors other than "g" are preponderant. Roe and Shakow's classification distinguishes the following categories: *remotely learned—vocabulary* (vocabulary, definition of abstract words); *remotely learned—other* (date, months, counting 20–0, etc.); *immediately learned* (repetition of digits, repetition of syllables, designs from memory, reading and report); *associative thinking—immediate* (comprehension, picture description, picture interpretation); *associative thinking—sustained* (ball and field, problems, rhymes, sentence construction); *conceptual thinking* (detection of absurdities, interpretation of fables, similiarities, differences, problems, induction).

Finally, the rationale offered by Terman (45) for each test item, though not systematically formulated, is most suggestive: *ball and field*—practical judgment;

rhymes—finding verbal associations under the direction of a guiding idea which inhibits irrelevant associations; *absurdities*—judgment, critical faculty; *memory for designs*—analysis of the visual impressions and creation of a meaningful whole which facilitates memory of the material; *fables*—generalization of the concrete, or social consciousness; *problems*—a function of the number and logical quality of the association with each of the given elements separately, and of the readiness with which these associations are yielded up and woven into some kind of unity; *arithmetical reasoning*—application readily and accurately of knowledge already possessed to the problems given.

The rationale of impairments offered remained inadequate in that there has been insufficient systematic definition of functions and their vicissitudes in various pathologies.

2. Scatter in inter-test comparisons—the "psychometric pattern" approach

A "psychometric pattern" was defined by Bijou as "a statement, numerical or verbal, of the relationship existing between two or more test ratings", (e.g., a verbal I.Q. and a performance I.Q.) (4, p. 354). The outstanding contribution of investigators of psychometric patterns has been the persistent striving for a rationale—that is, an understanding of what such a pattern refers to in the individual's personality makeup and everyday behavior. Studies of inter-test scatter are reviewed by Brody, Hunt and Cofer, and Bijou.

Brody (10, p. 239) reviewed investigations in which performance tests were compared with verbal tests.[3] There was general agreement that psychiatric patients (especially psychotics) were less proficient on the performance than on the verbal tests.

Hunt and Cofer (20, p. 988) reviewed some studies by English factor analysts who attempted to study scatter in terms of Spearman's factors: general ability (g), perseveration (p), fluency (f), will (w), and speed. These investigators found that manics low in "g" were high in "f", and that depressives had "f" scores relatively lower than "g" scores. Schizophrenics with very high "p" scores were relatively inaccessible. The scores changed with changes in the patients' clinical condition. "P" was abnormally high in both manic and depressed patients. Cases with hysteria showed consistently low "f" scores. These results are interesting but need to be related theoretically to the various psychiatric disorders.

Bijou's (4) review summarized studies of psychometric patterns of psychotics, habitual criminals, adolescent delinquents, mental defectives and school children.

Psychotic patients regardless of diagnosis showed the same general pattern: highest score on Terman vocabulary, second highest on Stanford-Binet, lowest on any of the performance tests. This pattern did not prevail in non-psychotics, and tended to disappear in psychotics who improved after insulin.[4] Bijou[5] found the same pattern to hold for habitual criminals. This pattern was explained as an inadequacy on tests "scored as strictly as possible" on the basis of time, accuracy and relevance (9, p. 10), and was considered an indication of poor "behavior efficiency".

Most delinquents and mental defectives exhibited a strikingly different pattern: low vocabulary and Stanford-Binet scores, with relatively high Performance I.Q.'s.[6]

---

[3] Outstanding are the investigations by Hollingworth (substitution test), Michaels and Shilling (Porteus maze test), Kent (Koh's Block Test).

[4] Jastak, 1937, 1939.

[5] Bijou, 1939.

[6] Glanville 1937, Bijou 1941, Kinder and Hamlin 1937, and Johnson and Fernow 1939.

However, some defectives had relatively low Performance I.Q.'s, and these, it was found, were least likely to make an adequate social adjustment.[7] Therefore, it appears that among mental defectives and adolescent delinquents, as well as in psychotics, a relatively low performance quotient is a serious indication of poor "behavior efficiency".

In maladjusted children[8] also the validity of using this psychometric pattern as an indicator of "behavior efficiency" was demonstrated. Those children with psychomotor ability considerably higher than verbal ability were referred to the mental hygiene clinic mostly for delinquent behavior; children with psychomotor ability lower than verbal were referred to the clinic mostly as personality defects, and formed the group in which psychoses, schizoid reactions and emotional instabilities predominated. Other papers not included in Bijou's review support these findings. Bijou (5, 8) and Bijou and McCandless (9) showed that those with impaired performance I.Q.'s were the most poorly behaved, most unstable, and least likely to adjust adequately in the training school situation, while those whose performance I.Q. was better made a good life adjustment.

Piotrowski (33) showed that schizophrenic children were poorer on performance tests, whereas congenitally defective children were poorer on verbal tests.

Not only from a disparity between verbal and performance I.Q.'s can the level of "behavior efficiency" be inferred. Jastak (22) and Bijou (5, 6) report that a disparity between arithmetic achievement scores and reading achievement scores apparently parallels the disparity between performance and verbal I.Q.'s. Bijou showed that using the two patterns together makes possible a more accurate prediction of "behavior efficiency". Earl (14) demonstrated that a discrepancy in scores on two verbal tests or on two performance tests can also be used as an indicator of emotional instability.

Hunt and Older (21) administered a battery of four short verbal tests, two written and two oral, to naval recruits with psychopathic personality, organic involvement, and schizophrenia. The psychopaths were distinctly better on the written than on the oral tests. There were significantly more neuropsychiatric discharges among cases with "inter-test variability of more than two years in mental age" than among those with a scatter of less than two years.

These studies established the validity of the psychometric pattern approach. The concept of "behavior efficiency" itself, however, is in need of more precise definition.

3. *Wechsler-Bellevue Intelligence Scale*

Further progress in scatter analysis might have been long delayed were it not for the advent of the Bellevue Scale. This test includes a wide variety of items which, unlike those of the Stanford-Binet, are grouped into eleven relatively homogeneous subtests, testing functions vulnerable to different kinds of maladjustments. Analysis of its scatter retains the merits of the psychometric pattern approach, and makes possible the investigation of a greater number of test score interrelationships.

a. *The first evaluations of scatter.* The first study on scatter in the Bellevue Scale was reported by Gilliland (15). He found scatter to be 35% greater in psychotics than in normals and, tracing subtest inter-correlations, he concluded that there were also pattern differences between the two groups. In a subsequent study,

---

[7] Hamlin 1938, Earl 1940.

[8] Uhler, 1937.

Gilliland, Wittman, and Goldman (16) determined (a) the significance of differences between mean weighted scores of various clinical groups[9] on each subtest and (b) the significance of differences in amount of intra-test variance. In this study they obtained no significant results. Weider (48), also studying differences in mean weighted scores, showed that young schizophrenics were significantly less proficient on the Digit Symbol subtest than were normals; older schizophrenics were less proficient on Digit Symbol, Object Assembly, and Picture Arrangement. This method of analysis is too gross, and can do little more than establish the most striking trends; this is shown by the fact that the data of both Gilliland and Weider contain many trends—in addition to those found by them to be significant—which are in agreement with the statistically significant findings reported in this volume.

The next advance was made by Rabin (36) who, in order to find specific patterns of subtest scores, ranked the subtests in order of magnitude of mean weighted scores and compared the patterns thus obtained from a group of schizophrenics and a group of nurses.

Weider (48) compared the rank order of mean subtest scores he obtained with that of Rabin (36) and Magaret (28). His results support Rabin in pointing out the superiority of the schizophrenics on Information and Comprehension, and their inferiority on Object Assembly. His results differ from Rabin's and support Magaret in the conclusion that schizophrenics are relatively inferior in Arithmetic. All found the lowest scores on Digit Symbol.

Rabin (36) then devised a "Schizophrenic Index" which was the ratio of Information + Comprehension + Block Design to Digit Symbol + Object Assembly + Similarities. This index successfully differentiated the schizophrenics from the neurotics, normals, and in a later study (37) from the manics. However, since Rabin's index does not consist of those subtests which best differentiated his two groups, and since he did not show that any of the subtests differentiate the groups with statistical reliability, the significance of the index as a measure of a schizophrenic test pattern remains questionable. Furthermore, the use of an index score of this sort is conducive to neglecting the study of the specific functions underlying selective impairment.

In a thoughtful study seeking differentiation between southern–northern, white–negro, and criminal–non-criminal groups, Machover (27) employed the method of determining the regression equation which afforded maximum differentiation between groups.

b. *The intra-individual method of scatter analysis.* The first intra-individual measure of scatter was suggested by Brown, Rapaport, et al. (12). These investigators determined the deviation of each of an individual's subtest scores from the mean of all of his subtest scores; they computed also the deviation of each of his verbal subtest scores from his verbal mean, and of each of his performance subtest scores from his performance mean. The mean deviation scores of schizophrenics, neurotics, depressives, and character disorders on each subtest were compared. The method proved fruitful, but since this was a study preliminary to the one reported in this volume, the results need not be discussed here.

The next reference to this measure was made by Wechsler (47b, p. 145–162) in his second edition, where for the first time he summarized the clinical impressions gained in using such a measure. He reports that schizophrenics score highest in Vocabulary and Information, and lowest in Digit Symbol and Object Assembly; and that Comprehension, Similarities, and Picture Completion may or may not have low scores, depending on the type of schizophrenia.

---

[9] Schizophrenics, paretics, manics, psychoneurotics, drug and alcohol cases, mental defectives, and a control group.

Using such a measure Magaret (28) found, like Brown, Rapaport, et al. (12), that schizophrenics scatter more than non-psychotics. Specifically, their Vocabulary and Information scores were significantly more above, and their Digit Symbol and Comprehension scores significantly more below, the mean, than was the case in a group of non-psychotics. In a later paper, Magaret and Wright (29) demonstrated significant differences between schizophrenics and mental defectives in the deviation scores on several subtests.

Rabin (38) used this measure in a recent study. An inspection of his data reveals a pattern of mean deviation scores in schizophrenics similar to that obtained by Magaret. This was especially true for patients who were retested about a year after they were admitted to the hospital.

c. *The combination of scatter measures.* Use of a combination of intra-individual scatter measures was first suggested by Wechsler (47b). The measures recommended included: (1) verbal minus performance scores, (2) deviation of subtest scores from the mean of all the subtest scores, and (3) specific subtest interrelationships. The first study demonstrating the advantage of using a combination of measures was made by Levi (25). He differentiated adolescent psychopaths from non-psychopaths; the former have a significantly higher percentage of cases with (1) performance I.Q. eleven or more points above verbal I.Q., and (2) Picture Arrangement + Object Assembly scores higher than Picture Completion + Block Design scores.

Schafer and Rapaport (43) define several measures of subtest interrelationships which, since they are also described in the present volume, will only be enumerated here: (1) vocabulary scatter, (2) modified mean scatter, (3) inter-subtest comparisons, and (4) very high or very low weighted scores.

d. *Rationale of subtests.* The first summary of the functions underlying proficiency on each of the subtests was given by Wechsler in 1939 (47a, p. 75–103), in the form of scattered comments in his description of the subtests. No more systematic rationale is given in the second or third edition of his book, although some rationale is offered in relation to specific psychiatric disorders.

Magaret (28, p. 523–527) felt the need to account for the pattern of successes and failures which she observed in schizophrenics. She showed that neither the time limits on some of the tests nor the differential effects of motivation could account for the patterns which were observed. No positive conclusions were drawn.

Machover (27, p. 64–66) offered some rationale to account for his findings, but did not present a rationale for each of the subtests.

Rabin refers only to impairment of "alertness and speed of association" (38, p. 88), or to "initiative in seeking and achieving an unknown goal" (36, p. 100).

The rationale developed in the present volume was first suggested by Brown, Rapaport, et al. (12), and was more systematically formulated by Reichard and Schafer (40).

We may conclude that, for the most part, the development of test rationale has lagged far behind the investigation of selective scatter.

BIBLIOGRAPHY ON SCATTER

1. Abel, T. M., and Hamlin, R., An analysis of capacities for performance of mental defectives skilled in lace-making. II. Performance pattern in selected non-standardized tasks. *J. Applied Psychol.* 22: 175–185, 1938.

2. ALTMAN, C. H., AND SHAKOW, D., A comparison of the performance of matched groups of schizophrenic patients, normal subjects, and delinquent subjects on some aspects of the Stanford-Binet. *J. Ed. Psychol.* 28: 519–529, 1937.

3. BARNES, G., A comparison of the results of tests in the Terman Scale between cases of manic depressive and dementia praecox psychoses. *J. Nerv. and Ment. Disease* 60: 579–589, 1924.

4. BIJOU, S. W., The psychometric pattern approach as an aid to clinical analysis—a review. *Am. J. Ment. Def.* 46: 354–362, 1942.

5. BIJOU, S. W., An experimental analysis of Arthur performance quotients. *J. Consult. Psychol.* 6: 247–252, 1942.

6. BIJOU, S. W., A genetic study of the diagnostic significance of psychometric patterns. *Am. J. Ment. Def.* 47: 171–177, 1942.

7. BIJOU, S. W., The measurement of adjustment by psychometric pattern techniques. *Am. J. Orthopsychiat.* 12: 435–438, 1942.

8. BIJOU, S. W., Behavior efficiency as a determining factor in the social adjustment of mentally retarded young men. *J. Genet. Psychol.* 65: 133–145, 1944.

9. BIJOU, S. W., AND McCANDLESS, B. R., An approach to a more comprehensive analysis of mentally retarded, pre-delinquent boys. *J. Genet. Psychol.* 65: 147–160, 1944.

10. BRODY, M. B., A survey of the results of intelligence tests in psychosis. *Brit. J. of Med. Psychol.* 19: 225–261, 1942.

11. BRODY, M. B., The measurement of dementia. *J. of Mental Sci.* 88: 317–327, 1942.

12. BROWN, J. F., RAPAPORT, D., DUBIN, S., AND TILLMAN, C. G. Analysis of scatter in a battery of tests. Read at Midwestern Psychological Association meeting, Athens, Ohio, 1941.

13. DEARBORN, G. V. N., The determination of intellectual regression and progression. *Am. J. Psychiat.* 6: 725–741, 1926-27.

14. EARL, C. J. C., A psychograph for morons. *J. Abn. and Soc. Psychol.* 35: 428–448, 1940.

15. GILLILAND, A. R., Differential functional loss in certain psychoses. (Abstract) *Psychol. Bull.* 37: 429, 1940.

16. GILLILAND, A. R., WITTMAN, P., AND GOLDMAN, M., Patterns and scatter of mental abilities in various psychoses. *J. Gen. Psychol.* 29: 251–260, 1943.

17. HAMLIN, R., AND ABEL, T. M., Test pattern of mental defectives skilled in weaving. *J. Appl. Psychol.* 22: 385–389, 1938.

18. HARRIS, A. J., AND SHAKOW, D., The clinical significance of numerical measures of scatter on the Stanford-Binet. *Psychol. Bull.* 34: 134–150, 1937.

19. HARRIS, A. J., AND SHAKOW, D., Scatter on the Stanford-Binet in schizophrenics, normal, and delinquent adults. *J. Abn. and Soc. Psychol.* 33: 100–111, 1938.

20. HUNT, J. McV., AND COFER, C. N., "Psychological Deficit". *Personality and Behavior Disorders* by Hunt, J. McV., pp. 971–989, 1944.

21. HUNT, W. A., AND OLDER, H. J., Psychometric scatter patterns as a diagnostic aid. *J. Abn. and Soc. Psychol.* 39: 118–123, 1944.

22. JASTAK, J., *Wide Range Achievement Test.* 23 pp. Wilmington, Del.: Chas. L. Story Co., 1941.

23. KENDIG, I., AND RICHMOND, W. V., *Psychological Studies in Dementia Praecox.* 211 pp. Edwards Bros., Inc., Ann Arbor, Mich., 1940.

24. Kinder, E. F., and Hamlin, R., Consistency in test performance pattern of mentally subnormal subjects. *Proc. Am. Assoc. on Ment. Deficiency* 42: 132–137, 1937.

25. Levi, J., *A Psychometric Pattern of the Adolescent Psychopathic Personality.* Doctoral Dissertation, N. Y. U., N. Y., 1943.

26. Lorr, M., and Meister, R. K., The concept of scatter in the light of mental test theory. *Educ. and Psychol. Measurement* 1: 303–309, 1941.

27. Machover, S., *Cultural and Racial Variations in Patterns of Intellect.* 87 pp. New York, Bureau of Publ., Teachers College, Columbia University, 1943.

28. Magaret, A., Parallels in the behavior of schizophrenics, paretics, and pre-senile non-psychotics. *J. Abn. and Soc. Psychol.* 37: 511–528, 1942.

29. Magaret, A., and Wright, C., Limitations in the use of intelligence test performance to detect mental disturbance. *J. Appl. Psychol.* 27: 387–398, 1943.

30. Malamud, W., and Palmer, E. M., Intellectual deterioration in the psychoses. *Arch. Neurol. and Psychiat.* 39: 68–81, 1938.

31. Myers, C. R., and Gifford, E. V., Measuring abnormal pattern on the revised Stanford-Binet Scale (Form L). *J. of Ment. Sci.* 89: 92–101, 1943.

32. Piotrowski, Z. A., Objective signs of invalidity of Stanford-Binet tests. *Psychiat. Quart.* 11: 623–636, 1937.

33. Piotrowski, Z. A., A comparison of congenitally defective children with schizophrenic children in regard to personality structure and intelligence type. *Proc. Amer. Assoc. on Ment. Def.* 42: 78–90, 1937.

34. Piotrowski, Z. A., The test behavior of schizophrenic children. *Proc. and Addr. of 57th Annu. Sess. of Am. Assoc. on Ment. Def.*, pp. 16, May–June, 1933.

35. Pressey, S. L., Distinctive features in psychological test measurements made upon dementia praecox and chronic alcoholic patients. *J. Abn. Psychol.* 12: 130–139, 1917–1918.

36. Rabin, A. I., Test-score patterns in schizophrenia and non-psychotic states. *J. Psychol.* 12: 91–100, 1941.

37. Rabin, A. I., Differentiating psychometric patterns in schizophrenia and manic-depressive psychosis. *J. Abn. and Soc. Psychol.* 37: 270–272, 1942.

38. Rabin, A. I., Fluctuations in the mental level of schizophrenic patients. *Psychiat. Quart.* 18: 78–91, 1944.

39. Rawlings, E., The intellectual status of patients with paranoid dementia praecox. *Arch. Neurol. and Psychiat.* 5: 283–295, 1921.

40. Reichard, S., and Schafer, R., The clinical significance of scatter on the Bellevue Scale. *Bull. of the Menn. Clinic* 7: 93–98, 1943.

41. Roe, A., and Shakow, D., Intelligence in mental disorder. *Annals of the New York Academy of Sciences* 42: 361–490, 1942.

42. Schafer, R., The expression of personality and maladjustment in intelligence test results. Paper read at N. Y. Ac. of Science, March, 1945.

43. Schafer, R., and Rapaport, D., The scatter in diagnostic intelligence testing. *Char. and Pers.* 12: 275–284, 1944.

44. Taft, G. C., and Kinder, E. F., An analysis of capacities for performance of mental defectives skilled in lace-making. *J. Appl. Psychol.* 20: 567–575, 1936.

45. Terman, L. M., *The Measurement of Intelligence.* 362 pp. Houghton Mifflin Co., Boston, 1916.

46. Trapp, G. E., and James, E. B., Comparative intelligence ratings in the four types of dementia praecox. *J. Nerv. and Ment. Dis.* 86: 399–404, 1937.

47. WECHSLER, D., *The Measurement of Adult Intelligence*. Baltimore, The Williams & Wilkins Co., (a) 1st edition, 229 pp., 1939, (b) 2nd edition, 248 pp., 1941, (c) 3rd edition, 258 pp., 1944.
48. WEIDER, A., Effects of age on the Bellevue Intelligence Scale in schizophrenic patients. *Psychiat. Quart.* 17: 337–346, 1943.
49. WELLS, F. L., *Mental Tests in Clinical Practice*. 315 pp. World Book Co., Yonkers on Hudson, N. Y., 1927.
50. WELLS, F. L., AND KELLEY, C. M., Intelligence and psychosis. *Am. J. Insanity* 77: 17–45, 1920.
51. WENTWORTH, M. M., Two hundred cases of dementia praecox tested by the Stanford revision. *J. Abn. Psychol.* 18: 378–384, 1923–24.
52. WORCHEL, P., Insulin shock on schizophrenic patients: psychometric results and progress notes. *Psychosom. Med.* 1: 434–437, 1939.

SUPPLEMENTARY BIBLIOGRAPHY

53. BARBER, E. R., *A study of scatter and the relative difficulty of subtests in the revised Stanford-Binet*. Master's Thesis, U. of Ill., 1938.
54. FONT, M. McK., The 1937 Stanford-Binet Scale as a technique in the diagnosis of schizophrenia. (Abstract). *Psychol. Bull.* 37: 547, 1940.
55. JOHNSON, A. P., AND FERNOW, D. L., Comparison of results of Stanford-Binet and performance tests given at the Dixon State Hospital. *Proc. Am. Assoc. on Ment. Def.* 44: 103–109, 1939.
56. MARTINSON, B., AND STRAUSS, A. A., A method of clinical evaluation of the responses to the Stanford-Binet Intelligence Test. *Am. J. Ment. Def.* 46: 48–59, 1941.
57. MATEER, F., Differential syndromes in Stanford-Binet failures. (Abstract) *Psychol. Bull.* 36: 508, 1937.
58. PIGNATELLI, M. L., A comparative study of mental functioning patterns of problem and non-problem children, seven, eight, and nine years of age. *Genet. Psychol. Monog.* 27: 69–162, 1943.
59. WECHSLER, D., AND ISRAEL, H., AND BALINSKY, B., A study of the subtests of the Bellevue Intelligence Scale in borderline and mental defective cases. *Am. J. Ment. Def.* 45: 555–558, 1941.

BIBLIOGRAPHICAL SOURCES

BIJOU, S. W., The psychometric pattern approach as an aid to clinical analysis—a review. *Am. J. Ment. Def.* 46: 354–362, 1942.

BRODY, M. B., A survey of the results of intelligence tests in psychosis. *Brit. J. of Med. Psychol.* 19: 225–261, 1942.

HARRIS, A. J., AND SHAKOW, D., The clinical significance of numerical measures of scatter on the Stanford-Binet. *Psychol. Bull.* 34: 134–150, 1937.

HUNT, J. McV., AND COFER, C. N., "Psychological Deficit". *Personality and Behavior Disorders* by Hunt, J. McV., 1944.

KENDIG, I., AND RICHMOND, W. V., *Psychological Studies in Dementia Praecox*. 211 pp. Edwards Bros., Inc., Ann Arbor, 1940.

PIGNATELLI, M. L., A comparative study of mental functioning patterns of problem and non-problem children, seven, eight and nine years of age. *Genet. Psychol. Monog.* 27: 69–162, 1943.

Roe, A., and Shakow, D., Intelligence in mental disorder. *Annals of the New York Academy of Sciences*. 42: 361–490, 1942.

Wechsler, D., *The Measurement of Adult Intelligence*. 258 pp. Baltimore: The Williams and Wilkins Co., 3rd edition, 1944.

B. REVIEW OF THE LITERATURE ON THE BABCOCK TEST

By Martin Mayman

Babcock's method is based on the idea that the extent of intellectual impairment can be evaluated by comparing a patient's subtest scores with the scores made by normals of equal "vocabulary age"; it is implied that vocabulary resists most the encroachments of mental disorder and thus may be used as an index of the patient's original intellectual level.

Here we review some of the studies using this method which are pertinent to the results in this volume.

1. *The "total efficiency index"*[1] *in various clinical groups*

In her first published study (2), Babcock found an average index of −4.8 in a group of paretics, the size of the negative index corresponding to the degree of deterioration. An index below −3.5 was found to be pathological. These findings were corroborated by Wittman (24) who reported an average index of −5.1 in paretics, with a fair degree of correlation between change in clinical condition after treatment and change in efficiency index. Brody (8) found that in a mixed group of organic and functional psychoses, the deterioration index corresponded well with the degree of deterioration. Organic disorders other than paresis were also reported to yield large negative indices (24, 5)[2] in excess of that found in functional disorders.

Schizophrenics studied by Babcock (3) had a median index of −3.5. Those paroled from open wards, paroled from closed wards, and those not paroled had medians of −1.6, −2.3, −3.8 respectively. Schwartz (18) found an average index of −3.4 and reported a definite relationship between the efficiency index and the clinical symptoms of deterioration. Bolles (7) obtained an average index of −3.7 in 10 hebephrenics. Wittman's (24) schizophrenic group had an average index of −.8 but was not considered to be representative. Babcock (5) found that the deterioration index of different types of schizophrenias decreased in the following sequence: hebephrenic, paranoid, catatonic, and simple. Psychopathic personalities, neurotics, and normals were reported to have even smaller negative indices (24, 5).

2. *Impairment of specific functions*

Repetition Efficiency (5, p. 112) which was high as compared to Learning Efficiency (5, pp. 110, 117) was found by Babcock in schizophrenics (3, 5). She referred to cases with such a pattern as showing a "typical mild dementia praecox profile" (5, p. 135). This pattern, according to Babcock, is the reverse of that found in senility and definite organic impairment (5, p. 136).

Other investigators agree in general with these findings. Wittman (24) and Schwartz (18) found that schizophrenics obtain their lowest scores in immediate and delayed paragraph recall and in learning paired associates. However, these items were considerably impaired in other psychotic groups also (alcoholics and paretics).

---

[1] Total efficiency index is referred to in this volume as Total Deterioration (T.D.). See pages 336 ff.

[2] With the exception of non-institutionalized epileptics reported by Barnes and Fetterman (6).

Manic-depressives did not show a discrepancy between Repetition and Learning, scoring relatively high on both (5, p. 137). Their motor responses, however, were slower than those of any other group including the organic.

Psychoneurotics are reported to have a repetition-learning pattern "similar to that of the mild dementia praecox condition" but deviating less from the norms (5, p. 135).

Brody (9) concludes that the pattern of impairment evident in his demented subjects was different only in degree, not kind, from that in normal senility and psychosis without dementia.

Schafer (17), reporting on some of the results published in this volume, gives statistical evidence that impaired learning efficiency and the repetition-learning pattern described by Babcock is characteristic of schizophrenics, and impaired motor efficiency characteristic of depressives. He also shows that schizophrenics do worse in delayed recall of a paragraph than in immediate recall.

The only study of the kinds of errors in test performance made by subjects with various mental illnesses is reported by Foster (12). The tests examined were repetition of digits and sentences, and memory for designs and paragraph. He found, among other things, that 70% of the paretics introduced irrelevant details in paragraph recall, while only 4% of the schizophrenics did. Brody (9) described the more general qualitative features of performance on the Babcock Test.

3. *Rationale of subtests*

According to Babcock (4, 5), the functions underlying performance on all of the tests are the "speed and control of inner associated mental activity" (4, p. 270). She does not make clear how this rationale justifies the division of subtests into easy tests, learning-, repetition-, motor-tests, etc., nor how it accounts for the patterns of impairment she describes. Some investigators follow Babcock in this rationale, emphasizing the vulnerability of the capacity to form new association (13, 18).

A different way of denying specificity of functions underlying subtests was chosen by Wittman[3] (25) and Wittman and Russel[4] (26). From the fact that they found poor "efficiency" to be highly correlated with "attitude" and lack of "cooperation", they were inclined to conclude that impairment evident on the tests reflected only a lack of interest and social rapport in the test situation.

Gilbert (14) in a more recent paper explains the distinction between tests involving simple repetition of "discrete units grasped in one moment of attention" (14, p. 76), and paragraph-recall which calls for "initial concentration, the grasping of meaning, and the formation of more or less lasting associations" (14, p. 78). Schafer (17) presents a similar rationale for these tests.

4. *Variations of the Babcock Method*

The method of measuring impairment by the drop below the vocabulary level of the scores on tests other than those Babcock used was first suggested by Wells and Kelley (23), and was used by other investigators with results similar to those obtained with the Babcock test (1, 8, 10, 11, 16, 19, 20, 21, 22).

Some studies did not find a direct relation between the extent of the discrepancy and the clinical evidences of "deterioration" (1, 15). Some light is shed on these negative results by Kendig and Richmond (15), who indicate that the superior vocabulary of their paranoid condition cases resulted in a deceivingly large negative

---

[3] Wittman used a group of 5 memory tests and 5 tests of reasoning.

[4] Wittman and Russel used a group of 7 efficiency tests.

"efficiency index." Furthermore, they suggested that the inferior vocabulary of the simple schizophrenics may have "existed before the onset of the psychosis" (15, p. 42). These findings concerning paranoid conditions and simple schizophrenia are borne out in the present volume.

BIBLIOGRAPHY ON THE BABCOCK TEST

1. Altman, C. H., and Shakow, D., A comparison of the performance of matched groups of schizophrenic patients, normal subjects, and delinquent subjects on some aspects of the Stanford-Binet. *J. Ed. Psychol.* 28: 519–529, 1937.
2. Babcock, H., An experiment in the measurement of mental deterioration. *Arch. Psychol.* No. 117, 1930.
3. Babcock, H., *Dementia Praecox: a psychological study.* Lancaster, Pa.; Science Press, 1933.
4. Babcock, H., The level-efficiency theory of intelligence. *J. of Psychol.* 11: 261–270, 1941.
5. Babcock, H., *Time and The Mind.* 304 pp. Cambridge Sci-Art, 1941.
6. Barnes, M. R., and Fetterman, J. L., The mentality of dispensary epileptic patients. *Arch. Neurol. and Psychiat.* 40: 903–910, 1938.
7. Bolles, M. M., The basis of pertinence. *Arch. Psychol.* No. 212, 1937.
8. Brody, M. B., The measurement of dementia. *J. of Ment. Sci.* 88: 317–327, 1942.
9. Brody, M. B., A psychometric study of dementia. *J. of Ment. Sci.* 88: 512–533, 1942.
10. Davidson, M., A study of schizophrenic performance on the Stanford-Binet Scale. *Brit. J. Med. Psychol.* 17: 93–97, 1938.
11. Davidson, M., Studies in the application of mental tests to psychotic patients. *Brit. J. Med. Psychol.* 18: 44–52, 1939.
12. Foster, J. C., Significant responses in certain memory tests. *J. Appl. Psychol.* 4: 142–154, 1920.
13. Gilbert, J. G., Mental efficiency in senescence. *Arch. Psychol.* No. 188, 1935.
14. Gilbert, J. G., Memory loss in senescence. *J. Abn. and Soc. Psychol.* 36: 73–86, 1941.
15. Kendig, I., and Richmond, W. V., *Psychological Studies in Dementia Praecox.* Edwards Bros., Inc., Ann Arbor, Mich., pp. 14–22, 1940.
16. Malamud, W., and Palmer, E. M., Intellectual deterioration in the psychoses. *Arch. Neurol. and Psychiat.* 39: 68–81, 1938.
17. Schafer, R., The significance of scatter in research and practice of clinical psychology. *J. of Psychol.* 18: 119–124, 1944.
18. Schwartz, R., Measurement of mental deterioration in dementia praecox. *Am. J. Psychiat.* 12: 555–560, 1932.
19. Shipley, W. C., and Burlingame, C. C., A convenient self-administering scale for measuring intellectual impairment in psychotics. *Am. J. Psychiat.* 97: 1313–1324, 1941.
20. Simmins, C., Studies in experimental psychiatry. IV. Deterioration of "G" in psychotic patients. *J. of Ment. Sci.* 97: 704–734, 1933.
21. Simmins, C., Spearman factors and psychiatry: measurement of mental deterioration. *Brit. J. Med. Psychol.* 14: 113–120, 1934.
22. Simmins, C., Mental incapacity: the intelligence of patients in mental hospitals. *Char. and Pers.* 4: 25–33, 1935.

23. Wells, F. L., and Kelley, C. M., Intelligence and psychosis. *Am. J. Insanity* 77: 17–45, 1920.
24. Wittman, P., The Babcock deterioration test in state hospital practice. *J. Abn. and Soc. Psychol.* 28: 70–83, 1933.
25. Wittman, P., An evaluation of opposed theories concerning the etiology of so-called "dementia" in dementia praecox. *Am. J. Psychiat.* 93: 1363–1377, 1937.
26. Wittman, P., and Russel, J. T., Mental efficiency levels before and after shock therapy. *Elgin Papers* 4: 70–81, 1941.

Supplementary Bibliography

27. Babcock, H., Personality and efficiency of mental functioning. *J. of Orthopsychiat.* 10: 527–531, 1940.
28. Brody, M. B., A survey of the results of intelligence tests in psychosis. *Brit. J. of Med. Psychol.* 19: 225–261, 1942.
29. Hall, M. E., Mental and physical efficiency of women drug addicts. *J. Abn. and Soc. Psychol.* 33: 332–345, 1938.
30. Hunt, J. McV., and Cofer, C. N., "Psychological deficit." *Personality and Behavior Disorders* by Hunt, J. McV., pp. 979–983, 1944.
31. Shipley, A., Comparison of two techniques for measuring intelligence impairment and deterioration. *Psychol. Bull.* 37: 438–439, 1940.

C. REVIEW OF THE LITERATURE ON THE THREE TESTS OF CONCEPT FORMATION

By Martin Mayman

Interest in tests of concept formation spread after the first World War, chiefly as a result of the studies of brain lesion cases by Goldstein and Gelb and their co-workers. Of the many tests developed, only those used in the present investigation will be treated in this review.

1. *The Hanfmann-Kasanin Test*

This test was originated by Ach (1), and modified by Sacharov (24) and Vigotsky (26). The test became known in this country mostly through the work of Hanfmann and Kasanin (15, 17, 16), and has been used for the most part in the study of schizophrenics, organic disorders, and children.[1]

Ach (1) designed his procedure to study normal thought processes. Vigotsky (26) first used the test to study schizophrenic thinking. He divides solutions of the test-problem into (1) "conceptual" ones, in which there is a general and abstract principle, and (2) "complex" ones, in which the grouping is concrete and mechanical. He concludes that schizophrenia is characterized by a regression from conceptual thinking to thinking in "complexes".

Hanfmann and Kasanin's (16) extensive study of schizophrenic, organic and normal subjects, was preceded by a descriptive publication (15) and a minor study of schizophrenics (17). They evaluate the level of thinking reflected by the test by means of a careful scoring of (1) the interpretation of the instructions by the subject, (2) the attempts at solution (classes, random groups, individual placement, physiognomic groups, primitive complexes, constructions, collections, pseudo-classes), and (3) the finding and mastering of the correct solution. Hanfmann and Kasanin support Vigotsky's conclusion, but make three essential modifications: (1) it is necessary to postulate more than two levels of thinking; (2) the highest "conceptual" level of thinking is reached in general by only the college-educated group of normals; and (3) only in one-third to one-half of all the schizophrenic cases can the presence of thought-defect be conclusively demonstrated by the test. The extent of this defect corresponded to the clinical picture.

---

[1] The exceptions are: (2, 14, 22).

Cameron (7) describes the test-performance of severely disorganized schizophrenics, and in contrast to the conclusions of Vigotsky (26) and Hanfmann and Kasanin (17), he maintains that generalizations are numerous in the attempts of schizophrenics at solution. He states that these generalizations were unsuccessful because they were either (1) too broad, (2) too involved, (3) too entangled with personal problems and phantasies, (4) the language structure was so disorganized that it could neither function as social communication nor serve as a basis for the patient's own performance, or (5) the generalizations, even when correct, often did not lead to any corresponding act. Hanfmann and Kasanin in their recent study (16, pp. 94–98) take issue with Cameron's use of the term "generalization".

Two studies in which this test was used deal with the problem of predicting success or failure of insulin treatment in schizophrenic patients. Both Bolles, Rosen, and Landis (6) and Zubin and Thompson (30) conclude that the outcome of insulin treatment may be successfully predicted. In both studies a battery of concept formation tests which included not only the Hanfmann-Kasanin Test, but also the Sorting Test, were used.

Patients with organic brain involvement are reported by Hanfmann and Kasanin (16, p. 83) to "manifest a defect comparable in character and degree to that found in the schizophrenic group".

Studies on children carried out by Rimat,[2] by Vigotsky (26), and by Thompson (25) all find that this test cannot be successfully solved by children. Conceptual thinking of the type called for by the test is not developed before puberty.

In a study of the test performance of superior normal adults, Hanfmann (14) describes two characteristic modes of approach: the "conceptual" and the "perceptual". Subjects using the "thinking" or "conceptual" approach tended to create hypotheses first and then turn to the blocks for verification of them. The subjects using the "perceptual" approach first intuitively grouped the blocks and then formulated a principle. A smooth coordination of both types of approach was found to be most efficient. Hanfmann suggests that these types of approach are related to the abstract-theoretical and practical-concrete modes of approach on the Rorschach Test.

Of theoretical import are the investigations conducted in Russia by Samukin and Birenbaum, and Birenbaum and Zeigarnik,[3] who, using concepts introduced by Lewin, maintain that conceptual thinking is connected with plasticity and good differentiation of "systems" within the subject, whereas different types of primitivization of thinking correspond either to extreme rigidity or extreme fluidity.

2. The Sorting Test

The Object Sorting Test was introduced by Gelb and described in detail by Weigl (29). The most comprehensive description of the test and procedure appears in Goldstein and Scheerer (11). The test as used in the present investigation was first described by Bolles and Goldstein (5). Investigations in which this test was used deal with organic brain disorders, schizophrenics and children.

Patients with cerebral lesions are characterized according to Weigl (29), and Goldstein and Scheerer (4), by the concreteness and inflexibility of their sortings. Both investigations classify groupings as either "categorical" or "concrete".[4]

---

[2] See (16, p. 89).

[3] See (16, p. 85).

In a patient tested 37 weeks after a head injury, Benton and Howell (3) report the occurrence of many failures and concrete responses on both Part I and II of the Sorting Test. Sortings made by senile patients, tested by Cleveland and Dysinger (9), were concrete and based on "use and reality in a non-immediate situation".

The findings on schizophrenics were similar to those reported on patients with organic pathology. Bolles (4, p. 29) found that hebephrenics "showed a marked tendency to sort on the basis of use in a concrete situation". Bolles and Goldstein (5, p. 22) report that a group of schizophrenics, most of whom showed evidence of deterioration, "tend to respond in a concrete way". Cleveland and Dysinger (9) report that the sortings of 5 schizophrenics was "qualitatively similar" to those made by their senile subjects. However, Bolles (4) observed, in addition, that some sortings made and the reasons given for them appeared "incoherent" to the examiner.

Bolles, Rosen and Landis (6) and Zubin and Thompson (30), who have already been mentioned, used the test successfully in predicting the outcome of insulin treatment in schizophrenics.

Investigations of the performance of children showed that kindergarten children made concrete and "highly imaginative" sortings (29); that children in the first three grades were able to define 4 of the 12 groupings presented by the examiner, but still made their own groupings in terms of a concrete situation (25); that children approximately 9–12 years of age in grades 3 to 6 could define at least one-half of the groupings presented by the examiner, and were better able to sort objects into categories or according to their use (25, 4); and that the progressive improvement in adequacy and conceptual level of sortings and verbalizations reached its peak at about 11 years of age (23).

A modification of this test was introduced by Halstead (12) and used by Kisker (19). After the subject had spontaneously made a number of groupings, the experimenter determined which other objects could be added to or removed from the group without spoiling it for the subject. Using this method Halstead came to the conclusion that, although patients with frontal lobe lesions were capable of grouping according to a "categorical attitude", the groups proved to be "objectively unstable" (12, p. 1285). Kisker, who tested psychotic patients before and after a prefrontal lobotomy, found it difficult to get them to change their original groups by accepting the addition of other objects. Those who were willing and went to great lengths to justify them proved to be the patients who showed least eventual clinical improvement (19, p. 149). Patients with frontal lesion and patients with prefrontal lobotomy grouped relatively few objects in the first spontaneous sorting, and in both groups there were patients who made abstract, categorical sortings.

3. *Verbal Concept Formation*

Very few studies have dealt primarily with the vicissitudes of verbal concept formation in mental illness. A review of the literature, at best, can only be suggestive.

Studies of selective scatter on the Binet were contradictory with regard to the prevalence of impairment on the Similarities items (see Appendix III-A). Studies of scatter on the Bellevue Scale for the most part did not report any special impairment on Similarities in schizophrenics; rather, they indicated that performance was relatively good. Wechsler, however, pointed out that Similarities may or may not show impairment, depending upon the type of schizophrenia dealt with. (See Appendix III-A.)

---

[4] The types of concrete groupings are summarized thus by Goldstein and Scheerer: (1) reality of use—uniqueness (results in no sorting), (2) preference for pairs, (3) occurrence in specific situation, (4) occurrence in a non-immediate situation (fabulated situation), and (5) sensory cohesion.

An early investigation concerned solely with verbal concept formation, and referred to by Hanfmann and Kasanin (16, p. 87), was carried out by Willwoll. Willwoll described two ways of arriving at a concept: (1) from images that accompanied the presentation of the two words, and (2) by actively grasping the relationship between the two words. Hanfmann and Kasanin draw a parallel between these two processes and the perceptual-concrete and abstract-conceptual types of concept formation observed on other concept formation tests.

Verbal concept formation in schizophrenia was studied by Wegrocki (28), who concluded that some but not all schizophrenics "tend to manifest a disorder in the function of generalization". Paranoids showed least disturbance in such generalizing ability, and hebephrenics most. He finds qualitative differences between the types of errors made by children and by schizophrenics, which suggest a "disruptive, fractioning process" in schizophrenia rather than a "regressive process" (28, p. 67).

Hanfmann (13) describes the performance of a schizophrenic patient on several tests of concept formation; the patient gave concrete responses on this as well as the other tests. Cleveland and Dysinger (9) report that many of their senile and schizophrenic subjects were able to give what seemed to be abstract conceptual responses on the Similarities subtest of the Bellevue Scale, although they made concretistic sortings on other tests. Vigotsky (26) states that words of schizophrenic patients coincide with ours in their object relationships but not in their meanings. Kasanin and Hanfmann (17, p. 37) point out that schizophrenics may use words which have become "carriers of concepts", and thus appear to be operating with concepts although actually the conceptual thinking is impaired.

Regarding patients with organic involvement, it is reported by Benton and Howell (3) that a patient, 37 weeks after a head injury, was totally unable to give any but concrete responses. Capps (8) included a test of verbal concept formation in a battery of tests used in the study of the vocabulary of deteriorated idiopathic epileptics.[5] He found this test to be "more closely related to the clinical estimates of deterioration than any other individual vocabulary test" (8, p. 63).

Verbal concept formation in children was studied qualitatively by Piaget (20). Some quantitative data concerning it is presented by Wechsler in the table of average scores of the standardization population of the Bellevue Scale (27, p. 214). The table shows that the scores on the Similarities subtest increase steadily from the age of 7, and level off at the age of 14.

4. Rationale

Goldstein's study (10) of cases with brain lesions led him to conclude that these patients suffered from a basic impairment of categorical behavior. They functioned on a concrete rather than an abstract level. Goldstein stressed the concreteness of their total behavior, Vigotsky (26) the concreteness of their thought. Nevertheless, both Vigotsky and Goldstein used tests of concept formation to determine whether a patient functioned on an "abstract" or a "concrete" level; other investigators followed suit.

These concepts proved successful in differentiating between the test performance of patients with organic pathology and deteriorated schizophrenics on the one hand, and normal test performance on the other hand. On the basis of this dichotomy, however, some schizophrenics who were not severely disorganized did not appear to show any impairment (16). Furthermore, such a rationale makes it virtually impossible to differentiate various types of neuroses, depressions, etc. To meet these difficulties, it has been necessary to ask what the thought processes are which can lead to the formation of an abstract concept. Only by means of this more fundamental rationale can one attempt to study subjects who have not lost what has been termed "abstract attitude".

---

[5] The Categorization Test is a multiple choice test, requiring choosing of words which can be subsumed under a given concept.

Hanfmann's (14) study of concept formation in normals, in which she concludes that an integration of the "thinking"-conceptual approach and the "perceptual"-concrete approach is the most efficient mode of approach, suggests the same interplay of inductions and deductions which is described in this volume.

The view of concept formation presented in this volume was advanced in preliminary form by Brown and Rapaport (21), Reichard, Schneider and Rapaport (23), and Reichard and Rapaport (22).

BIBLIOGRAPHY ON CONCEPT FORMATION

1. Ach, N., *Ueber die Begriffsbildung*, Hamburg, Buchner, 1921.
2. Aldrich, C. K., The relationship of the concept formation test to drug addiction and to intelligence. *J. Nerv. and Ment. Dis.* 100: 30–34, 1944.
3. Benton, A. L., and Howell, I. L., The use of psychological tests in the evaluation of intellectual function following head injury: report of a case of post-traumatic personality disorder. *Psychosom. Med.* 3: 138–151, 1941.
4. Bolles, M. M., The basis of pertinence. *Arch. Psychol.* No. 212, 1937.
5. Bolles, M. M., and Goldstein, K., A study of the impairment of 'abstract behavior' in schizophrenic patients. *Psychiat. Quart.* 12: 42–65, 1938.
6. Bolles, M. M., Rosin, G. P., and Landis, C., Psychological performance tests as prognostic agents for the efficacy of insulin therapy in schizophrenia. *Psychiat. Quart.* 12: 733–737, 1938.
7. Cameron, N., Schizophrenic thinking in a problem-solving situation. *J. Ment. Sci.* 85: 1012–1035, 1939.
8. Capps, H. M., Vocabulary changes in mental deterioration. *Arch. Psychol.* No. 242, 1939.
9. Cleveland, S. E., and Dysinger, D. W., Mental deterioration in senile psychosis. *J. Abn. and Soc. Psychol.* 39: 368–372, 1944.
10. Goldstein, K., The significance of psychological research in schizophrenia. *J. Nerv. Ment. Dis.* 97: 261–278, 1943.
11. Goldstein, K., and Scheerer, M., Abstract and concrete behavior. *Psychol. Monog.* No. 239, 1941.
12. Halstead, W. C., Preliminary analysis of grouping behavior in patients with cerebral injury by the method of equivalent and non-equivalent stimuli. *Am. J. Psychiat.* 96: 1263–1294, 1940.
13. Hanfmann, E., Analysis of the thinking disorder in a case of schizophrenia. *Arch. Neurol. and Psychiat.* 41: 569–579, 1939.
14. Hanfmann, E., A study of personal patterns in an intellectual performance. *Char. and Pers.* 9: 315–325, 1941.
15. Hanfmann, E., and Kasanin, J., A method for the study of concept formation. *J. Psychol.* 3: 521–540, 1937.

16. Hanfmann, E., and Kasanin, J., *Conceptual Thinking in Schizophrenia.* Nerv. and Ment. Dis. Monog., No. 67, New York, 1942.
17. Kasanin, J., and Hanfmann, E., An experimental study of concept formation in schizophrenia. *Am. J. Psychiat.* 95: 35–48, 1938.
18. Kasanin, J., and Hanfmann, E., Disturbances in concept formation in schizophrenia. *Arch. Neurol. and Psychiat.* 40: 1276–1282, 1938.
19. Kisker, G. W., Abstract and categorical behavior following therapeutic brain surgery. *Psychosom. Med.* 6: 146–150, 1944.
20. Piaget, J., *The Language and Thought of the Child.* New York, Harcourt Brace, 1932.
21. Rapaport, D., and Brown, J. F., Concept formation and personality research. Paper read at meeting of the American Psychological Association, Evanston, Ill., 1941.
22. Reichard, S., and Rapaport, D., The rôle of testing concept formation in clinical psychological work. *Bull. Menn. Clin.* 7: 99–105, 1943.
23. Reichard, S., Schneider, M., and Rapaport, D., The development of concept formation in children. *Am. J. Orthopsychiat.* 14: 156–161, 1944.
24. Sacharov, L., Methods of investigating concepts. *Psikologia* 3: 3–33, 1930.
25. Thompson, J., The ability of children of different grade levels to generalize on sorting tests. *J. Psychol.* 11: 119–126, 1941.
26. Vigotsky, L., Thought in schizophrenia (translation). *Arch. Neurol. and Psychiat.* 31: 1063–1077, 1934.
27. Wechsler, D., *The Measurement of Adult Intelligence.* 248 pp. Baltimore, The Williams & Wilkins Co., 1941.
28. Wegrocki, H., Generalizing ability in schizophrenia. *Arch. Psychol.* No. 254, 1940.
29. Weigl, E., On the psychology of so-called processes of abstraction (translation). *J. Abn. and Soc. Psychol.* 36: 3–33, 1941.
30. Zubin, J., and Thompson, J., *Sorting Tests in Relation to Drug Therapy in Schizophrenia.* 23 pp. Edwards Bros., Inc., Ann Arbor, Mich., 1941.

INDEX OF AUTHORS

Abel, T., 554, 555
Ach, N., 9, 391, 561, 565
Aldrich, C., 565
Altman, C., 549, 555, 560

Babcock, H., 87, 319, 320, 321, 331, 332, 333, 341, 345, 356, 370, 372, 485, 558, 559, 560, 561
Balinsky, D., 557
Barber, E., 557
Barnes, G., 549, 555
Barnes, M., 558, 560
Bender, L., 250
Benton, A., 563, 564, 565
Bijou, S., 551, 552, 555, 557
Birenbaum, G., 562
Bolles, M., 558, 560, 562, 563, 565
Bolles, R., 485
Brody, M., 549, 551, 555, 557, 558, 559, 560, 561
Brown, J., 553, 554, 555, 565, 566
Buehler, K., 215, 485
Buerger-Prinz, H., 485
Burlingame, C., 560

Cameron, N., 562, 565
Capps, H., 564, 565
Cassirer, E., 388, 485
Cleveland, S., 563, 564, 565
Cofer, C., 549, 551, 555, 557, 561

Davidson, M., 560
Dearborn, G., 555
Dubin, S., 553, 554, 555
Dysinger, D., 563, 564, 565

Earl, C., 552, 555
Escalona, S., 216, 252, 485

Fernow, D., 551, 557
Fetterman, J., 558, 560
Font, M., 557
Foster, J., 559, 560
Frank, L., 216, 485
Freemont-Smith, F., iii
Freud, S., 131, 148, 196, 388, 485

Gelb, A., 561, 562
Gibson, W., iii
Gifford, E., 549, 550, 556
Gilbert, J., 559, 560
Gill, M., iii
Gilliland, A., 552, 553, 555
Glanville, A., 551, 553
Gleimann, A., iii
Goldman, M., 553, 555
Goldstein, K., 9, 250, 257, 273, 396, 485, 561, 562, 563, 564, 565

Hall, M., 561
Halstead, W., 563, 565
Hamlin, R., 551, 552, 554, 555, 556
Hanfmann, E., 462, 472, 477, 485, 561, 562, 564, 565, 566
Harris, A., 42, 485, 548, 549, 555, 557
Hilgard, E., 37, 216, 485
Hollingworth, H., 551
Howell, I., 563, 564, 565
Hunt, J., 549, 551, 552, 555, 557, 561

Israel, H., 557

James, E., 549, 556
Jastak, J., 551, 552, 555
Johnson, A., 551, 557

Kaila, M., 485
Kasanin, J., 462, 472, 477, 485, 561, 562, 564, 565, 566
Katona, G., 176, 485
Kelley, C., 549, 557, 559, 561
Kendig, I., 549, 550, 555, 557, 559, 560
Kent, G., 551
Kinder, E., 551, 556
Kisker, G., 563, 566
Koehler, W., 176, 485
Koffka, K., 176, 485

Landis, C., 562, 563, 565
Leist, E., iii
Levi, J., 554, 556
Lévy-Bruhl, L., 388, 485
Lewin, K., 250, 562

Long, L., 37, 485
Lorr, M., 556
Lozoff, M., iii

Machover, S., 553, 554, 556
Magaret, A., 553, 554, 556
Malamud, W., 548, 549, 556, 560
Marquis, D., 37, 216, 485
Martinson, B., 557
Mateer, F., 557
Mayman, M., 548, 558, 561
McCandless, B., 552, 555
Meister, R., 556
Menninger, K., iii
Merei, F., iii
Michaels, J., 551
Mill, S., 37
Murray, H., iii, iv
Myers, C., 549, 550, 556

Older, H., 552, 555

Palmer, E., 548, 549, 556, 560
Piaget, J., 388, 485, 564, 566
Pignatelli, M., 557
Piotrowski, Z., 549, 552, 556
Pressey, S., 548, 549, 556

Rabin, A., 553, 554, 556
Rapaport, D., 89, 131, 176, 216, 396, 485, 486, 553, 554, 555, 556, 565, 566
Rawlings, E., 556
Reichard, S., iii, 396, 399, 486, 554, 556, 565, 566
Richmond, W., 549, 550, 555, 557, 559, 560
Rimat, F., 562
Roe, A., 42, 486, 549, 550, 556, 558
Rosen, G., 562, 563, 565
Russel, J., 559, 561

Saharov, L., 9, 391, 561, 566
Samukin, P., 562
Schafer, R., 554, 556, 559, 560
Scheerer, M., 9, 257, 275, 396, 485, 562, 563, 565
Schilder, P., 250
Schneider, M., 396, 486, 565, 566
Schwartz, R., 558, 560
Selz, O., 215, 486
Shakow, D., iii, 42, 178, 249, 485, 486, 548, 549, 550, 555, 556, 557, 558, 560
Shilling, M., 551
Shipley, W., 560, 561
Simmins, C., 560
Socrates, 113
Stoddard, G., 37, 38, 486
Strauss, A., 557

Taft, G., 556
Terman, L., 550, 556
Thompson, J., 562, 563, 566
Tillman, C., 553, 554, 555
Trapp, G., 549, 556

Uhler, C., 552

Vigotsky, L., 9, 561, 562, 564, 566

Wechsler, D., iv, 44, 47, 109, 114, 120, 121, 129, 147, 149, 156, 176, 194, 195, 200, 234, 276, 315, 486, 553, 554, 557, 558, 564, 566
Wegrocki, H., 564, 566
Weider, A., 553, 557
Weigl, E., 9, 486, 562, 566
Welch, L., 37, 485
Wellman, B., 37, 486
Wells, F., 549, 550, 557, 559, 561
Wentworth, M., 549, 557
Werner, H., 147, 233, 250, 385, 388, 426, 486
Wertheimer, M., 250
Willwoll, A., 564
Wittman, P., 553, 555, 558, 559, 561
Wolfner, I., iii
Worchel, P., 549, 557
Wright, C., 554, 556

Yacorzynski, G., 88, 486

Zeigarnik, G., 562
Zubin, J., 562, 563, 566
Zurbuchen, W., iii

INDEX OF SUBJECTS

(*Italicized numbers indicate major references*)

Abbreviations, 33
Abstract Attitude, 273, 396
Abstract Conceptual Definition, 149, 403, 409–416
Active Concept Formation, 395, 399
Adequacy of Concept Formation, 401 ff., 409–416, 417–425
Administration, v
Analytic Process, 275
Anticipation, 199, 215 ff., 387
  visual —, 255–256
Anxiety, 30, 193, 209, 259, 261, 262, 268, 270, 282, 290, 316, 345, *380*, 429, 440, 474
  — and Digit Span, 183, 185 ff.
  — in Patrol Group, *see* Normals
Anxiety and Depression, *27*, 262, *313*, 421, 439, *460–461*
Arithmetic, 166, 194 ff.
  — and Digit Span, 169 ff., 196
  — and Information, 197
  — in Neurotics, 199
  psychology of —, 199
  — in Schizoids, 172 ff.
  — in Schizophrenia, 171
  vulnerability of —, 166, 171, 194, 195
Attention, 167–168, 169, 193, 219, 289, 325, 355–356, 386
Attention and Concentration, 87, 166, 355
  — in Schizoid Normals, 172 ff., *see* Normals
  — in Schizophrenia, 171–172

Babcock Test, 7, 319, 450
  literature of —, 558 ff.
  — long form, 320
  raw data of —, 523 ff.
  — and Scatter, 221, 319 ff.
  — short form, 320 ff.
Bellevue Scale, 7, 44 ff., 450
  literature of —, 522 ff.
  raw data of —, 515 ff.
Belongingness, 147 ff., 386, 387–388, 398
  affective —, 398–399
Blandness, 186, 262, 270, 298
Blind Diagnosis, 12–13
Block Design, 252, 256, 271 ff., *see* Performance Subtests
  stability of —, 271, 280

Case Abstract, 15–16
Case Material, 15 ff
Chain Sorting, 404, 409–416
Character Disorder, 18
Chi² Test, 32
Closure, 255, 257
Compliant Concept Formation, 395, 399
Comprehension, 109 ff., 197
  vulnerability of —, 113
Compulsive Adjustments, 98, 474
Concentration, 168–169, 195 ff., 231 ff., 325, 355–356, 386
  — and knowledge, 231–232
  — in Picture Completion, 197–198
  — in subtests other than Arithmetic, 196–198, 268, 295
  — and timing, 199
  visual —, 198, 231 ff.
Concept
  — content, 148, 389, 400
  — realm, 148, 389, 400
Concept Formation, 146 ff., 383 ff., 478 ff.
  active —, 395, 399
  adequacy of —, 401 ff., 409–416, 417–425
  basic —, 462–463
  compliant —, 395, 399
  development of —, 417, 425–426, 429, 433
  everyday—, 399
  — and knowledge, 155–156
  literature of —, 561 ff
  — and logics, 389
  — and symbolism, 147
  — in thought processes, 147, 385 ff.
  verbal —, 146 ff., 395
Concept Span, 401, 405, 425 ff.
  loose —, 405–406, 409–416, 425–429
  narrow —, 398, 406, 409–416, 429–433t
  split-narrow —, 406, 409–416

Conceptual Level, 402 ff.
  abstract—, 149, 403, 409–416
  chain—, 404, 409–416
  concrete—, 148–149, 151, 403, 409–416
  fabulation type—, 404, 409–416
  functional—, 149, 151, 403, 409–416
  symbolic—, 404, 409–416
  syncretistic —, 403, 409–416
Concrete Conceptual Level, *see* Conceptual Level, concrete
Content of the Concept, 148, 400
Control Group, *see* Normals
Cultural Predilection, 39, *see also* Educational Environment and Item Analysis, cultural factors in —

Decision Time, 260
Deduction, 390–391, 400, 431, 475
Definitions, Adequacy of —, 402, 409–417
Depression, *23 ff.*, 61, 188, 207, 228, 246, 260, 262, 278, 282, 293, *310–312*, 345, 355, 365, 366–367, 368, 371, 377, *380*, 423, 433, 442, 445, 449, 451, *458–459*
Depressive-like Neuroses, 98, 287, 348, *380*, 424, 439, 442, 445, 451, *see also* Anxiety and Depression, Neurasthenia
Depressive Neuroses, *24*, 77, 160, 192, 230, 239, *311*, 341, *380*, 439, 484, *see also* Depressive Trends, Depression
  Neurotic Depression, *24*, *311–312*, *313*
  Severe Neurotic Depression, *24*, 155, *311–312*
Depressive Patrol, *see* Normals, Depressive Trends
Depressive Psychoses, *23*, 57, 72, 75, 100, 128, 144, 155, 160, 192, 224, 239, 242, 267, 280, 297, *311*, 341, 348, *380*, 421, 439, 484, *see also* Depression
  Involutional Depression, *23*, 122, 139, *311*
  Psychotic Depression, *24*, *311*
Depressive Trends, 64, 260–261, 262, 270, 280, 287, 295, 429, 431, 474
Development
  arrest of —, 38, 130
  — of concept formation, 417, 425–426, 429, 433, *see also* Concept Formation
  set back of —, 38, 130
Differential Scatter, 61 ff.
Digit Span, 166, 176 ff., 321, 323, 333
  — and anxiety, 183, 185 ff.
  — and Arithmetic, 169 ff., 171
  — and concentration, 196
  — forward and backward, 178, 180–182
  high weighted scores of —, 170
  — and memory, 176 ff.
  — and schizoidness, 172 ff.
  visualization of —, 180
  vulnerability of —, 166, 176
Digit Symbol, 251, 256, 273, 288 ff., *see also* Symbol Digit
Disparity of Efficiency, 72
Distortion Score, 356–357 ff., *see also* Memory
  — examples, 358–360
Doubt, 112, 290

Educational Environment, 39, 88, 129–130, 165, 199, 221–222, 228, 236, 315, 423, 439, 442, 484
Efficiency Score, 320–321
Ego Psychology, 8, 168, 169, 326, 388
Einstellung, 215–216
Energies
  — freely available to the Ego, 168–169, 171, 199
  specifically deployed —, 168

Fabulation, 404, 409–416
Flexibility, 464–465
Fluidity, 464
Functional Autonomy, 6
Functional Definition, 149, 151, 403, 409–416

Gestalt, iii, 255, 326
"Good Front", 171
Guesses, 132

Hanfmann-Kasanin Test, 7, 273, 462 ff., 393, 483–484
  acceptable solutions of —, 468–469
  indicators of pathology on —, 470–472
  literature of —, 561 ff
Hysteria, *25*, 90, 122, 128, 135–136, 139, 144, 188, 225, 242, 262, *364*, *380*, 434 451, 459, *see also* Neuroses
Hysterical Character, 25
Hysteric-like Neuroses, 121, 144, *312*, *see also* Neuroses

Identifiability, 386
Imagery, 180, 255
Impulsive Patrol, *see* Normals

Incomplete Pictures, 255
Induction, 390–391, 400, 431, 475
Inefficiency, *see* Item Analysis
Information, 129 ff., 177, 197
  — and Comprehension, 120
  — and memory function, 130–131
  stability of —, 138
  — and Vocabulary, 138
Inhibited Patrol, *see* Normals
Inquiry, 90, 131–132, 200, 220, 234, 259, 291, 407
Intellectualization, 38, 89
"Intellectualizing" Groups, 98, 112, 133, 144, 165, 212, 225, 242
Intelligence, 37, *see also* Natural Endowment
Involutional Depression, *see* Depressive Psychoses
I.Q., 45
  — and scatter, 50, 305
Item Analysis, 40, 130
  cultural factors in —, 96, 97, 98, 132, 153, 221–222, 236, *see also* Cultural Predilection, and Educational Environment
  impairment, 93, 116, 119, 120, 200, 278
  level of attainment, 91, 119, 132
  temporary inefficiency, 37, 94, 116, 118, 119, 130, 180, 200, 254, 258, 259, 278

Judgment, 111 ff., 219–220

Koh's Block Test, 271
Korsakow Syndrome, 215

Learning, 289
  — efficiency, 328–329, 345–349
  — vs. repetition, 349–356
  tests of —, 323–329
Level of Aspiration, 252
Logics, 389
Loose Sorting, 398, 405–406, 409–416, 425, 429, *see also* Sorting Test

Maturation, 38, 89, 129–130
Maze Tracing, 329, 333
Mean Scatter Measures, 53 ff., 67 ff.
Memory, 319, 324–327, 387
  delayed —, *see* Story Recall
  distortion scores of —, 356–357, *see* Distortion Scores
  distortions in —, 358–360
  error percentage in —, *see* Story Recall
  fragmentary —, 357, 364
  immediate —, *see* Story Recall
  out of place —, 357, 364
Mental Defective, 50
Minnesota Preschool Scale, 255
Mixed Neurosis, *26*, *380*, 420, 443, 461
Motor Efficiency, 329–331, 354, 372–379
Motor Speed, 257, 258, 260, 290, 293, 327

Narrow Sorting, 398, 406, 409–416, 429–433, *see also* Sorting Test
Natural Endowment, 38, 129–130, *see also* Intelligence
Neurasthenia, *27*, 100, 136, 261, *314*, *380*, 421, 423, 449, 460–461
Neuroses, *24 ff.*, 78, 160, 188, 199, 212, 239, 246, 266, 280, 297, *312–314*, 348, 355, 364, 366, 372, *380*, 424, 434, *459 ff.*
  depressive-like —, 98, 287, 348, *380*, 424, 439, 442, 445, 451, *see also* Anxiety and Depression; Neurasthenia; Depressive-like Neuroses
  hysteric-like —, 121, 144, 312
  obsessive-like —, 121, *312*
Neurotic Depression, *see* Depressive Neuroses
Non-Representative Tests, 5–6
Normals, v, *28*, 72, 123, 128, 137, 144, 160, 188, 193, 212, 228, 239, 242, 246, 266, 270, 280, 293, 297, *314*, 341, 348, 355, 364, 366–367, 372, 380, 424, 434, 442, 480, 481
  Anxious —, *30*, 185 ff., 188, 193, 219, 268, 270, 282, 297, *316*, 345, 348, *380*, *453*, *see also* Anxiety
  Borderline Adjusted —, *28–29*, 102, 165, 288, 440
  Depressive —, *30*, 61, 64, 243–244, 269–270, 314, *see also* Depressive Trends
  Impulsive —, *30*, 115
  Inhibited —, *30*, 431, 433, *453*
  Maladjusted —, *28*–29, 165, 288, 440
  Schizoid —, *29*, 172 ff., 186–187, 193, 209, 265, 270, 285–286, *315*, 345, 348, 427, 429, 441, 444, 452, *453*, 454
  Well-Adjusted —, *28*, 144
Nosology, v, 16 ff.

- Object Assembly, 215, 253 ff., 267, 271, *see also* Performance Subtests
- Obsessional Character, *26*, 175
- Obsessive-Compulsive Neurosis, *25–26*, 90, 122, 128, 139, 156, 193, 224, 242, 293, *313*, 380, 433, 434, 451, *459*, *see also* Neuroses
- Obsessive-like Neuroses, 121, 312
- Out-of-Pattern Relationship, 172 ff., 190, 199–200, 269, 355
- Paired Associates, 328–329, 334
    - vulnerability of —, 329
- Paranoid
    - — character, 22
    - — conditions, *22*, 156, 224, 230, *309*, *457*
    - — states, 22
- Paranoid Schizophrenia, *19 ff.*, 58, 123, 128, 155, 246, 293, *307–308*, 421, 442, 445, 449, 451, *456–457*, *see also* Schizophrenia
    - Acute —, 165, *307–308*, 444, *see also* Schizophrenia, Acute
    - Chronic —, 122, 139, 165, *307–308*, 448, *see also* Schizophrenia, Chronic
    - Deteriorated —, 165, *307–308*, *see also* Schizophrenia, Deteriorated
- Paranoid Trends, 151, 484
- Patrol, *see* Normals
- Pattern Coherence, 257 ff., 269, 275, 326
- Performance Subtests, 45, 197, 214 ff.
    - vulnerability of —, 215
- Persistence, 464, 465
- Picture Arrangement, 214 ff., *see also* Performance subtests
    - vulnerability of —, 215, 219–220
- Picture Completion, 197–198, 230 ff., 286–287, *see also* Performance subtests
    - hierarchy of impairments on —, 239, 242
    - vulnerability of —, 231
- Planning Ability, 215
- Preschizophrenia, 21–22, 228, 230, 267, 280, 293, 297, *310*, 348, *380*, 427, 429, 433, 444, 445, *458*, 480, 484
    - Coarctated —, *310*, 364, 366, *380*
    - Over-Ideational —, 90, 224, *310*, 337–338, 366–367, *380*
- Projective Hypothesis, 10
- Psychology of Thinking, 8, 10, 37, 215, 385 ff
- Psychometric Pattern, 551
- Psychopaths, 220
- Psychotic Depression, *see* Depressive Psychoses
- Rationale, Psychological, v, 5, 10, 87, 110, 147, 166, 176, 195, 215, 231, 249 ff., 254–259, 271–275, 289–291, 321 ff., 385 ff., 399 ff., 401, 463 ff., 554, 559, 564
- Repetition Efficiency, 322–323, 341–345
- Repression, 38, 89, 122, 130
- Rhythm, 179, 377
- Rigidity, 464, 465
- Rorschach Test, 7, 255
- Scatter
    - — analysis, 9, 40
    - — on Babcock Test, 319, 321
    - concept of —, 48 ff., 170–171
    - diagnostic potency of —, 304
    - I.Q. and —, 50, 305
    - literature of —, 548 ff.
    - measures of —, 51 ff.
    - — on Stanford-Binet Test, 42, 548 ff.
- Scattergram, 47, 299 ff.
- Scheming, 220
- Schizoid Patrol, *see* Normals
- Schizophrenia, *18–19*, 72, 75, 128, 169, 171–172, 187, 207, 242, 260, 261, 263, 270, 278, 282, 287, *305–309*, 341, 345, 348, 355, 364, 365, 366–367, 368, 371, *379*, 421, 427, 429, 431, 433, 442, 445, 447, 479, *see also* Paranoid Schizophrenia and Unclassified Schizophrenia
    - Acute —, *20*, 230, 239, 260, *308*, *379*, *see also* Paranoid Schizohrepnia Acute, and Unclassified Schizophrenia Acute
    - Chronic —, 20, 128, 230, 239, 260, 270, *308*, 421, 423, 439, 484, *see also* Paranoid Schizophrenia, Chronic and Unclassified Schizophrenia, Chronic
    - Deteriorated —, 20, 61, 128, 190, 207, 224, 260, 267, 268, 270, 279, *308*, 423, 439, *see also* Paranoid Schizophrenia, Deteriorated and Unclassified Schizophrenia, Deteriorated

Sentence Repetition, 321, 334
  stability of —, 323
Sentence Writing, 330, 333
  — and Symbol Digit, 375–376
Severe Neurotic Depression, *see* Depressive Neuroses
Significance, statistical, 33
Similarities, 146 ff., 197, 393, 394 ff., 478 ff.
  stability of —, 147, 150
Simple Schizophrenia, 55, 57, 100, 139, 155, 223, 242, 261, 270, *308–309*, 337, 440, *457*
Small Sample, v, 32
Sorting
  adequacy of—, 401, 409–416, 417–425
  indications of impairment of —, 450
  meticulousness of —, 433
  process of —, 400
Sorting Test, 373, 393, 395, 396 ff.
  literature of —, 562, 563
  — Part I, 395, 397
  — Part II, 395, 397
Special Figures, 78 ff.
Special Tables, 78 ff.
Stanford-Binet, 42
  scatter on —, 548 ff.
Statistical Significance, 33
Story Recall, 178–179, 323–327, 332, *see also* Memory
  delayed —, 177, 324, 327, 364–365, 367–368
  error percentage on —, 365–366 ff.
  immediate —, 177, 323, 326, 361–364, 366–367
Symbol Digit, 327, 330, 332, 377, *see also* Digit Symbol
  stability of —, 328
Synthetic Process, 275
Szondi Test, 7

"t" Test, 32
Temporary Inefficiency, *see* Item Analysis
Thematic Apperception Test, 7, 255, 325
Thinking, Psychology of, *see* Psychology of Thinking
Time Perspective, 216
Total Efficiency, 331, 336–341
Total Scatter, 61 ff., *see also* Scatter

Unclassified Schizophrenia, 19 ff., 155, 194, 212, *306–307*, 421, 445, 451, *454–455*, *see also* Schizophrenia
  Acute —, 174, 190, *306*, *see also* Schizophrenia, Acute
  Chronic —, 139, *306*, *see also* Schizophrenia, Chronic
  Deteriorated —, 100, 239, 242, 293, 297, *307*, 345, 449, *see also* Schizophrenia, Deteriorated

Verbal Coherence, 150, 156, 394–395
Verbal Concept Formation, 146 ff., 394, *see also* Concept Formation
  literature of —, 563–564
Verbalization, 10, 90, 114, 150, 151–152, 234, 235
Verbal-Motor Coherence, 327
Verbal Subtests, 44–45, 61, 87, 109
Visual-Motor Coordination, 45, 87, 249 ff., 254 ff., 271 ff., 289 ff.
  motor action in —, 252, 255 ff., 274
  stability of —, 251
  visual organization in —, 251–252
Visual Organization, 45, 87, 214 ff., 255 ff., 274–275, 283, 289–290
Vital Data, 40, 489 ff.
Vocabulary, 57, 65, 87 ff., 88, 99, 108–109, 336
  deterioration of —, 100, 104, 335
  — scatter, 52, 299
Vocabulary Age, 320, 335

Weigl, Color-Form Test, 273
Word Association Test, 7, 325

Form No. 3.

PSY, RES.L-1

Bureau of Educational & Psychological Research Library.

The book is to be returned within the date stamped last.

26.9.60		
14.4.63		
-8 JUN 1967		
29.8.67		

WBGP-59/60-5119C-5M

151.2
RAP

Form No. 4

BOOK CARD

Coll. No. 151.2 RAP Accn. No. 661

Author. Rapapont, D.

Title. Diagnostic Psyl. testy v. 1

Date.	Issued to	Returned on
26.7.60	5660	[illegible]
14.4.63	[illegible]	[illegible]

151.2
RAP